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## SUMMARY OF RECENT ABSTRACTS*

### IV. TRYPANOSOMIASIS†

#### African Trypanosomiasis

*General: Reports: Epidemiology*

The Report for 1956–57 of the Tsetse Fly and Trypanosomiasis Committee (p. 602) pays attention to work on the food of flies, their resting places and the relevance of these to the application of insecticides. Work is being done on the characteristics of strains of *Trypanosoma gambiense* and *T. rhodesiense,* and on trypanocidal drugs.

In the Report for 1956 of the West African Institute for Trypanosomiasis Research (p. 15) Nash concludes that Melarsen is a valuable alternative drug for the treatment of *T. gambiense* infection under field conditions, especially for advanced disease or relapses, and that Berenil gives promise of usefulness. Studies with marked *Glossina palpalis* show that it has a greater tendency to concentrate at water holes, even in the wet season, in the Kaduna area where sleeping sickness is rife, than in Ugbobigha where it is not. More than half the *G. palpalis* examined had fed on reptiles and more than three-quarters of the *G. morsitans* on pigs. Much of the Report relates to animal trypanosomiasis.

In the Report of this Institute for 1957 (p. 1082) the work is recorded under the headings of human trypanosomiasis, animal trypanosomiasis and the insect vector. *G. palpalis* which fed on the first day of life were more easily infected than those which did not feed until later, but newly emerged flies are not very willing to feed in laboratory conditions, and this may explain the low infection rate of flies caught at village water holes in Northern Nigeria, and supports the belief that sleeping sickness is spread mainly in the hot dry season when the

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin,* 1958, v. 55. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on trypanosomiasis in this series see the May issues of the *Tropical Diseases Bulletin* each year since 1939.

fly is likely to take its first meal soon after emergence. In the dry north, however, flies were captured and recaptured much more commonly round water holes than in the humid south, indicating much closer contact with man in the north, and explaining why sleeping sickness is relatively more common there than in the south, in spite of lower potential infection rates in the flies. Various experiments were carried out on new drugs, and on the older, well known, drugs.

In Northern Nigeria (p. 872) the survey incidence in 1957 remained at 0·15%, most patients being in the early stage. Foci of intense transmission still persist, however, and the disease could soon spread if control was neglected. Mass chemoprophylaxis is used with success for infected riverside villages near railway stations, for mine workers, and in areas of high incidence. Vegetational clearing is continued and an insecticidal trial indicated that in one area (Benue) a single application of dieldrin might be enough where 4 applications of DDT were needed, though in Katsina one application of DDT was very effective.

APTED, in the Sleeping Sickness Report for 1956 (p. 258), describes the progress of sleeping sickness in Tanganyika where the incidence has been falling but where new foci continue to be found. He describes the control measures in force and the drugs used in treatment, some of which are new. In the Report for 1957 he (p. 1085) shows that although most cases are of the *T. rhodesiense* form, *T. gambiense* infection exists in lake-side areas. The policy now is to open up and develop the country by discriminative clearing rather than to retreat from the fly behind settlement boundaries, but the old settlements are maintained. Pentamidine prophylaxis is used in the *gambiense* areas, but it is now proposed to spray with insecticide the rivers which cannot be cleared owing to rapid regeneration of bush. Mel B is being used, and nitrofurazone in patients resistant to Mel B.

In discussing the outbreak of trypanosomiasis discovered in Ghana some years ago SAUNDERS (p. 18) observes that *T. gambiense* generally appears in the blood before it appears in the glands, and that outbreaks with a high proportion of blood trypanosomes are probably either new epidemics or recrudescences in an early stage. A very comprehensive study of the epidemiology of trypanosomiasis in Ashanti, Ghana, has been published by SCOTT (p. 376), who traces the outbreak of the epidemic in the Northern Territories in the 1920's, and describes its spread southwards along the main roads. The disease persists in the forest area in spite of mass survey and treatment, and the suggestion is made that this may be the result of infection from a reservoir in lower animals, or of re-introduction of infection by migrant workers. There is no relation between the incidence of the disease and the main river systems, or cattle routes, or season in Ashanti.

ROBERTSON and BAKER (p. 1306) recall outbreaks of *T. rhodesiense* infection in Uganda, one connected with fishermen who moved frequently along a road infested with *G. pallidipes,* and one largely connected with farmers infected in their villages after abnormal rains had resulted in spread of *G. pallidipes*. All strains isolated were *T. rhodesiense,* but some patients were free from symptoms, and one was apparently a healthy carrier. Transmission appeared to be man-fly-man and the main reservoirs were asymptomatic infected persons and patients relapsing after suramin treatment. Circumstantial evidence strongly suggests that wild animals serve as reservoir hosts of *T. rhodesiense,* but this

trypanosome had not been isolated from wild game when ASHCROFT (p. 1307) described his attempts to do so. He inoculated blood from 74 animals shot in Tanganyika into rats and isolated one strain of trypanosome from one hartebeeste, but inoculation into man was negative and the strain was accepted as *T. brucei*. This negative finding, however, does not invalidate the generally accepted hypothesis.

### *Transmission*

FOSTER (p. 487) describes the laboratory colonies of *G. morsitans* and *G. austeni* maintained, with difficulty, in Tanganyika. Of the two, *G. austeni* seems to be a potentially more suitable species for laboratory culture.

BURSELL (p. 871) reports a study of the water balance of tsetse pupae, and the methods of regulation of water loss. Species fall into 2 groups—those which can tolerate a loss of about 29% of their original weight (*morsitans, swynnertoni, longipennis*), and those which can tolerate a loss of only 24% (*palpalis, pallidipes, brevipalpis, austeni*).

Only a relatively few female *G. swynnertoni* are normally found on fly rounds, and ISHERWOOD (p. 132) therefore concludes that a large number of flies must be in a resting condition, and a search revealed that among these resting flies the proportion of females was high, and few of them were hungry. A knowledge of their resting sites may be useful in work with insecticides. HARLEY (p. 1207) in Uganda estimated the "standard availability" of *G. morsitans*. This indicated that 1 non-teneral male fly caught per 10,000 yards of fly round is equivalent to a population of between 50 and 526 non-teneral males per square mile, whereas the figure formerly calculated for Tanganyika was that 1 caught fly represented 10 per square mile. A single fly caught in Uganda therefore represents a much larger population.

JEWELL (p. 987) uses fluorescent paint for marking tsetse flies, which can then be recognized by ultra-violet light, and RENNISON *et al.* (p. 987) have devised a method of attaching microscopic glass beads to the flies, which reflect light from a torch as in modern road signs; this method appears to be useful in finding flies (and possibly other insects) at night.

JORDAN (p. 870) studied the mating behaviour of female *G. palpalis*.

Olfactory stimulation of tsetse flies was studied by HUGHES (pp. 131, 132), who found that carboxylic acids present in sweat stimulated them, and concluded that a compound having low vapour pressure, low dielectric constant and high dipole moment is likely to be a good olfactory stimulant. He suggests that such stimulants might be used to increase the efficiency of sprayed insecticides against the flies.

GLASGOW *et al.* (p. 1206) investigated the food of tsetse flies in one area of Tanganyika, where most *G. swynnertoni* and *G. pallidipes* had fed on Suidae. They believe that flies seek out the preferred host, and the general association of fed flies with any particular animal does not necessarily mean that the flies have used the animal as a host. In some areas *G. morsitans* had fed mostly on Suidae, but in other places these animals were relatively unimportant, probably because they were not available.

### *Aetiology*

As a result of a study of the electrophoretic patterns of the sera of infected animals, SENECA *et al.* (p. 1092) conclude that of the haemoflagellates

*Leishmania donovani* is the most primitive member, the African trypanosomes are the connecting link, and *T. cruzi* is the most advanced member.

WEINMAN (p. 377) refers to his techniques for cultivating *T. gambiense* and *T. rhodesiense* from blood or cerebrospinal fluid, which facilitate diagnosis in difficult cases. Contamination is dealt with by using penicillin or dihydrostreptomycin.

POLGE and SOLTYS (p. 869) froze various trypanosomes to −79°C., and found that up to 90% survived for 8 months without losing their virulence or other properties. 10% glycerol had a protective action. Survival at −20°C. and −40°C. was much shorter than at −79°C.

BAKER and ROBERTSON (p. 18) examined the infectivity for *G. morsitans* of a strain of *T. rhodesiense* and one of *T. brucei*. Morphologically they were indistinguishable and their virulence to rats was similar; the *T. rhodesiense* strain, however, was pathogenic for man, but not the *T. brucei* strain. Both strains were, however, equally able to infect the flies, and female and male flies were infected in the same proportion. The longevity of the flies was not affected by the infection. Some of these results do not agree with earlier work by various authors.

FAIRBAIRN (p. 1309) shows that *T. rhodesiense* can find their way through the peritrophic membrane of *G. palpalis* where it lines the roof of the proventriculus, and where it is still soft, and not only, as was thought, in the region of the proventriculus where the membrane is secreted.

In an investigation of the polymorphism of *T. brucei* and *T. rhodesiense* ASHCROFT (p. 869) observed that during a rise in parasitaemia the slender forms predominated, to be replaced by stumpy forms as parasitaemia decreased. This is probably the result of the action of antibodies, which inhibit the division of the slender forms and bring about their transformation into stumpy forms which rarely multiply and are mostly destroyed. This explanation is supported by the fact that injection of cortisone leads to prevalence of the slender forms. In the Report of the West African Institute for Trypanosomiasis Research (p. 1082) a similar point is made, that long slender forms of human trypanosomes in animals (which are the dividing forms) change at the end of an increase in numbers into stumpy forms which are more resistant to the defence mechanism of the host.

WILLETT and GORDON (p. 636) investigated the migration of *T. brucei* and *T. rhodesiense* from the site of deposition in guineapigs after infective bites by tsetse flies, and show that blood infections develop concurrently with, or before, development at the local site. There was no indication of a cryptic cycle of development. FAIRBAIRN and GODFREY (p. 1308), on the other hand, find that in man *T. rhodesiense* remains in the primary nodule (or chancre) at the site of the bite, and that the blood is first invaded only some days later. The metacyclic forms apparently remain localized at the bite, and give rise to long blood trypanosomes.

INOKI *et al.* (p. 486) report studies on the antigenic variation of *T. gambiense* in mice.

SOLTYS (p. 739) describes work on the neutralization and the agglutination reactions with various strains of trypanosomes. The neutralization reaction distinguishes between strains within species, and the agglutination reaction between species. After the first passage of *T. brucei* in rabbits the trypanosomes became insensitive to neutralization with serum of the host rabbit or

other rabbits, though these sera continued to neutralize the parent strain. Similar changes occurred at the third passage in the agglutination reaction, and the author points out that these findings do not agree with the current theory of antigenic modification of the strain. He thinks that the strain becomes serum-resistant, and postulates a protective mechanism rather than an antigenic change.

FULTON and SPOONER (p. 487) confirm earlier work which suggested that the respiratory rate of old syringe-passaged strains of *T. rhodesiense* is higher than that of recently isolated strains. The new strains are lysed much more rapidly than the old, but this can be prevented by increasing the amount of horse serum in the medium, from 10% to 80%.

### *Pathology: Clinical Features*

VAN BOGAERT and JANSSEN (p. 133), in a long paper, describe the lesions of the nervous system in *T. gambiense* infection, stressing the importance of axial involvement in the central nervous system, which is as important as the classical cortical involvement; trypanosomiasis belongs to the group of leuco-encephalitides. RADERMECKER (p. 988) reports electro-encephalographic studies in trypanosomiasis, in a substantial paper which should be read in full. Various forms of mental affection may occur, from neurasthenia in the prodromal period, through mental deterioration to dementia in the final stages. RAINAUT (p. 259) remarks that these conditions vary with the individual, and are not linked clearly with the pathological stages of the disease.

COLLOMB and MILETTO (p. 378) discuss the sequelae of sleeping sickness, which may be psychological, neurological or endocrine, and COLLOMB and SALLES (p. 1310) discuss the pathogenesis of some nervous manifestations. Examination of peripheral nervous tissue from patients with *T. gambiense* infection showed various types of degeneration and interstitial neuritis; JANSSEN *et al.* (p. 988) suggest that the periodical liberation of endotoxin from parasites destroyed during repeated trypanolytic crises would account for these lesions.

### *Treatment: Chemoprophylaxis*

FROMENTIN (p. 637) investigated the trypanocidal action of certain commonly used drugs, and estimated their titre in nervous tissue and serum from treated mice. The original should be consulted for details.

NEUJEAN and EVENS (p. 634) discuss the diagnosis and treatment of *T. gambiense* infection on the basis of 10 years of work in the Belgian Congo, pointing out that the problem is now one of diagnosis and radical cure of the individual patient rather than control of the infection to prevent spread. They discuss gland puncture, repeated blood examination, blood culture, and the complement-fixation test. In treatment they have found pentamidine better than suramin in the early stage, and Arsobal better than tryparsamide after the central nervous system has become involved, though tryparsamide may be useful in relapse after Arsobal treatment. However, suramin given with pentamidine reduces the toxicity of the latter and this is the treatment of choice before the central nervous system is invaded.

BURKE (p. 133) in the Belgian Congo notes the great reduction in incidence which has taken place in recent years, but observes that the disease as now seen progresses more rapidly than before, with earlier and more marked

involvement of the nervous system. He has used Arsobal for patients in whom resistance to tryparsamide is shown, and found it particularly useful, especially when several courses are given. It should not be used in newly diagnosed cases unless there are advanced meningeal or meningo-encephalitic changes. Some toxic effects are mentioned, the immediate mortality attributable to the drug being 1·7%.

In a comparison of the effects of various drugs in the treatment of *T. rhodesiense* infection DE ANDRADE SILVA (p. 741) comments that patients treated with Arsobal benefited to a greater extent than those treated with other drugs, but that a number died from the toxic effects of the drug. Great caution and continuous vigilance are therefore necessary with Arsobal. Most of the patients in this series were in an advanced stage of the disease.

TAUBE and NIXON (p. 1088) used Mel B in *T. rhodesiense* infections and compare the results very favourably with those previously obtained with suramin and tryparsamide, though further observation of the patients is needed.

Nitrofurazone has already been shown to cure *T. gambiense* and *T. rhodesiense* infections in mice, but EVENS *et al.* (p. 135), though finding it satisfactory for *T. gambiense* in guineapigs, achieved only poor results for *T. rhodesiense* in those animals. They (p. 136) tried it in human *T. gambiense* infection and found it effective, when given by mouth, against trypanosomes in the blood and in the cerebrospinal fluid. It passes the blood-brain barrier. It should not be given alone in refractory cases. A "cocktail" treatment of suramin, pentamidine, Arsobal and nitrofurazone produced improvement in some apparently hopeless cases.

TOBIE (p. 19) shows that nucleocidin has some effect against *T. gambiense* in mice, but is somewhat toxic.

HEULS *et al.* (p. 1087) report favourably on stylomycin (given orally) in the early and intermediate stages of *T. gambiense* infection, but not in the late stage. TRINCÃO and RUI NOGUEIRA (p. 874) found that stylomycin (puromycin) is a poor prophylactic against experimental *T. rhodesiense* infection in mice, and has untoward effects on their kidneys.

For an outbreak of *T. rhodesiense* infection in Mozambique DE ANDRADE SILVA and CASEIRO (p. 741) used pentamidine prophylaxis (4–5 mgm. per kgm. on 4 occasions at intervals of 6 months). Side effects occurred but were not common and the epidemic was arrested.

### *Control*

In a large focus of *G. morsitans submorsitans* in a forest island in Northern Nigeria MACLENNAN and KIRKBY (p. 873) used DDT for spraying the vegetation; 1 or 2 applications were made in different parts, and the fly disappeared within 5 weeks, and had not returned 18 months later. The final result with *G. tachinoides* was indefinite.

The report of the Tsetse Control Department of Uganda (p. 604) defines the main objectives as the reclamation of fly-infested territory in north and central Uganda and the establishment of human settlements and cultivation, and reports considerable progress on these lines. Control includes discriminative clearing, late burning, construction of roads, undercutting along river banks, the hunting of buck and other animals, and the use of drugs and insecticides. The formation of consolidation lines of human settlement and activity has converted game-infested tsetse bush into game-free cultivated land.

## American Trypanosomiasis

### *Chagas's Disease*
### *General: Transmission*

Peñalver *et al.* (p. 989) made a survey of Chagas's disease in El Salvador, where *Rhodnius prolixus* and *Triatoma dimidiata* are found, and *Trypanosoma rangeli* occurs along with *T. cruzi,* being occasionally found in man. They report a study of the cardiac condition in Chagas's disease. For treatment they have used primaquine diphosphate, which seems to have some value though the final effect is not yet known. The disease is still widely prevalent in South America—in Chile (Forgacs *et al.*, p. 138), Peru (Náquira and Náquira, p. 138) and Brazil (De Lucena and Costa, p. 139). Information is given about the tests used in these surveys.

Zeledón and Vieto (p. 490) found that the local vector in Costa Rica, *Triatoma dimidiata,* was not as susceptible to a Costa Rican strain of *T. cruzi* as were triatomids from other countries, particularly *Rhodnius prolixus* from El Salvador, and they suggest that *R. prolixus* should therefore be used for xenodiagnosis. Abalos (p. 639) shows that *T. infestans* is the only vector of *T. cruzi* to man in Argentina, and up to 80% of them may harbour the parasite. He gives an account of the habits of the bug.

### *Aetiology: Clinical Features: Treatment: Control*

Pick (p. 139) describes the cultivation of *T. cruzi* in rabbit blood ingested by Reduviid bugs, in which leishmania forms develop. In comment Hoare explains that these forms are not comparable with the intracellular forms observed in the mammalian host.

Warren (p. 742) used tissue culture methods to study the glucose consumption, lactic acid production and changes in amino-acid content of the medium during culture of *T. cruzi* in chicken macrophages. The findings should be sought in the original. Bash-Lewinson and Grossowicz (p. 489) discuss the transaminases of *T. cruzi.*

Ghelelovitch and Chassignet (p. 140) investigated the effect of size of inoculum of *T. cruzi* on the level of parasitaemia in mice.

Noetzel *et al.* (p. 992) describe the cerebral changes observed in a fatal case of Chagas's disease in a child; many small scattered nodules were seen throughout the brain, mostly related to blood vessels, but leishmania forms, though seen occasionally, were not always present.

Nussenzweig and Faria (p. 991) describe an antiglobulin test for the diagnosis of Chagas's disease. Suspected serum is incubated with live *T. cruzi,* and the mixture is centrifuged and washed; the trypanosomes are then mixed with antiglobulin serum, and in positive cases they are agglutinated. This test ran closely parallel with the complement-fixation test, but the need to use living trypanosomes makes it difficult.

In Brazil Rassi and Carneiro (p. 1091) record cardiovascular symptoms in 79% of a group of patients with Chagas's disease, mostly slight, but there was heart failure in almost 20%. They discuss the electrocardiographic findings.

Koberle (p. 489) emphasizes the association between Chagas's disease and mega-oesophagus and megacolon, and describes the process by which tissue forms of *T. cruzi* invade smooth muscle and by liberating a neurotoxin destroy the cells of the ganglia. He (p. 640) thinks that the lesions of the cells of the

autonomic nervous system caused by neurotropic toxins liberated by the leishmania forms of *T. cruzi* are the only lesions responsible for the clinical features and pathological anatomy of the disease. The most impressive manifestation in the hollow viscera is enteromegaly. The best treatment may be some form of antitoxin and a specific agent against the trypanosome. DE REZENDE (p. 1091) refers to the relationship between Chagas's disease and mega-oesophagus in Brazil, and to the cardiac abnormalities (including right bundle branch block) in this disease. MINEIRO (p. 1208) also relates mega-oesophagus to Chagas's disease, and PEREIRA and GONÇALVES (p. 1209) discuss the state of the muscle in the hypertrophic phase of this condition.

HOWARD *et al.* (p. 140) describe 3 cases of congenital Chagas's disease; one of the infants was 30 hours old when trypanosomes were found, and one was 75 days old but had been away from any possible source of infection; the third was the twin of the second. Treatment was with Spirotripan (Hoechst) or Primaquine and the infants were alive 3 months later; they were the first with congenital Chagas's disease reported to have survived.

RIBEIRO (p. 1092) refers to the acute form of Chagas's disease, and to the effect of oxytetracycline in treatment, which caused reduction of symptoms but did not eradicate the parasites. Similarly Spirotripan seemed to kill the blood forms but had no sterilizing action on the infected organism.

In experimental huts artificially infested with *Triatoma infestans* PERLOWAGORA-SZUMLEWICZ (p. 20) showed that even at a dosage of 7·2 gm. per square metre of surface dieldrin failed to eradicate the bugs completely, though reducing their numbers by 99·4%. Survival of the few was attributed to the cryptic habits of the fully fed bugs; young bugs were very susceptible.

### *Other Trypanosomiases*

HERBIG-SANDREUTER (p. 742) reports work on the multiplication forms of *T. rangeli* in the mammalian host, but failed to find developmental forms in the tissues, or evidence of pathological change in infected mice and monkeys. No dividing forms were found in the blood. *Charles Wilcocks*

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## MALARIA

*In this section abstracts are arranged as far as possible in the following order:*—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

JANICKI, M., DYMOWSKA, Z. & ŁUKASIAK, J. **Malaria in Poland 1945–1955, with particular reference to its Occurrence in Warsaw.** *Trop. & Geograph. Med.* Amsterdam. 1958, Dec., v. 10, No. 4, 371–8, 3 figs. [24 refs.]

This is an abbreviated English version of a Polish paper—see this *Bulletin*, 1958, v. 55, 124.

GIBSON, F. D. **Malaria Parasite Survey of some Areas in the Southern Cameroons under United Kingdom Administration.** *West African Med. J.* 1958, Dec., v. 7 (n.s.), No. 4, 170–78, 1 fig. [14 refs.]

A malaria survey of 5 localities in the Southern Cameroons was conducted in 1957. Entomological results are published separately in the same number of the journal [see SERVICE, M. W., below, p. 510]. 1,221 children under 15 years of age were examined. Comparing areas lying respectively under and over 5,000 feet above sea-level, the parasite rate was significantly lower at high altitudes in infants (45·6% and 61·5%) and children under 5 (59·9% and 73·4%) but not in older children. References to several other papers on serious endemic malaria at high altitudes are listed [this *Bulletin,* 1946, v. 43, 92; 1949, v. 46, 898]. The *Plasmodium malariae* infection rate was 4·3%. *P. ovale* was found in 0·4% of the low altitude group. The sickle-cell trait was found in only 1·4% of 1,045 examined, and was not correlated with parasite rates.

Tables give details of parasite rates and density indices, and of gametocyte rates, by age; tables of an unpublished spleen census by BRUCE-CHWATT are reproduced.

*B. B. Waddy*

TOUMANOFF, C. Enquête sur le paludisme dans la Basse-Guinée, Conakry et presqu'île de Kaloum, saisons sèches de 1956 et 1957. [**Survey of Malaria in Lower Guinea. Observations in Conakry and the Kaloum Peninsula in the Dry Seasons of 1956 and 1957**] *Méd. Trop.* Marseilles. 1958, Sept.–Oct., v. 18, No. 5, 822–41, 6 maps. [11 refs.]

The author reports in detail the results of two malariometric surveys carried out in the town of Conakry and in the nearby peninsula of Kaloum in Guinea, French West Africa. These surveys show that the parasite rate in Conakry, 12·4%, is considerably lower than was previously recorded in several surveys, but that the rate increases as one moves away from Conakry until hyperendemic conditions are still found about 20 km. away. *Plasmodium falciparum, P. vivax* and occasionally *P. malariae* were found but *P. ovale* was not recorded on these occasions, though it had previously been found. The slides showing *P. vivax* were each examined by 5 persons who concurred in the diagnosis, and the assertion that this species does not exist in West Africa should therefore be received with caution. It appears from the discussion that the reduction of malaria follows from a prolonged campaign of imagicidal control which has been shown from this work to have been incompletely successful, leaving sufficient residual malaria to permit a subsequent outbreak of the disease if insecticidal treatment were stopped.

43 mothers with their newly born children were examined within 24 hours of childbirth and among them, 1 single mild infection of *P. falciparum* was found in a thick drop preparation taken from an infant 12 hours after birth, the mother also being infected. Transplacental infection is thereby shown to occur but is not sufficiently frequent to account for the residual malaria found.

*G. Macdonald*

See also p. 572, LAARMAN, **Research on the Ecology of Culicine Mosquitoes in a Forest Region of the Belgian Congo.**

SERVICE, M. W. **Mosquito Survey of some Areas in the Southern Cameroons under United Kingdom Administration.** *West African Med. J.* 1958, Dec., v. 7 (n.s.), No. 4, 161–9. [15 refs.]

This is a report of a mosquito survey carried out during the dry season in the British Cameroons, between January and February 1957. Anopheline mosquitoes were widespread and were found breeding near the four main towns. Both anopheline and culicine mosquitoes were found breeding in streams and pools around villages in the mountains, and *Anopheles gambiae* is recorded here at an altitude of 3,500 feet on the slope of the Cameroons Mountain. In the Mamfe and Bamenda districts to the north of the area surveyed *A. gambiae* was not found (although recorded here previously) and *A. funestus* is believed to be the principal vector of malaria in these districts during the dry season. This species was found to breed abundantly in bare rock pools, as well as in streams, marshland and forest pools. Around Kumba and Victoria, near the coast, *A. gambiae* was more common than *A. funestus*. Lists of mosquitoes are given for the four districts surveyed, and also a list of 15 species of *Anopheles,* including a new species, *A. buxtoni,* and 46 species of culicine mosquitoes, including *Aëdes aegypti, A. simpsoni* and *A. africanus,* which have been recorded from the British Cameroons. Some similarity is noted between the fauna of this area and the mosquito fauna of East Africa.

*B. R. Laurence*

LEWIS, D. J. **The Recognition of Nulliparous and Parous** *Anopheles gambiae* **by examining the Ovarioles.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1958, Sept., v. 52, No. 5, 456–61, 40 figs. [19 refs.]

The successive follicles in an ovariole of *Anopheles gambiae* are shown to be connected by a strand of tissue, the funicle. The funicle of the first follicle, *i.e.*, nearest the lumen of the ovary, in nullipars is usually to be seen as a short strand extending down from the follicle with some degree of minor segmentation along its length. All this lies within the loose ovariole sheath containing the follicles, like a glove loosely fitting over a finger. In parous females the strand-like funicle of the next developing follicle could be seen to be continuous with some remnant of the ruptured follicle from which an egg had just been discharged. In some instances this old follicle was seen complete as a wrinkled sac-like dilatation at the end of the funicle joining it to the developing follicle. These results were obtained from dissections of nulliparous females, and parous ones which had laid one batch of eggs. The possibility of detecting chains of follicles in multiparous females, as described for *A. maculipennis* by Russian workers, is noted.

[Readers of this *Bulletin* will be familiar with the special article by GILLIES, summing up his translations of Russian work on this subject (this *Bulletin,* 1958, v. 55, 713).]

*D. S. Bertram*

BÜTTIKER, W. **Observations on the Physiology of Adult Anophelines in Asia.** *Bull. World Health Organization.* Geneva. 1958, v. 19, No. 6, 1063–71. [18 refs.]

From a consideration of literature on anophelines of temperate and tropical lands and some observations by the author on *Anopheles culicifacies* in

Afghanistan, Ceylon and Burma and *A. aconitus* in Burma, it is suggested that quiescence, or diapause, in anopheline mosquitoes may be defined as hibernation, semi-hibernation, or " partial quiescence ". In the first category, at least for the Palaearctic *maculipennis* complex, fat is the nutritional reserve for winter, feeding is wholly or partially suspended, and sexual activity (ovarian development) ceases. In semi-hibernation, as for *A. culicifacies*, *A. annularis*, *A. hyrcanus* var. *sinensis* and *A. fluviatilis* in cooler seasons in their range, facts are limited but suggest some fat reserve formation, repeated feedings, and at least suspension of sexual activity in a proportion of females.

The present observations concerning *A. culicifacies* and *A. aconitus* indicate that very hard, dry blood meals in the gut may form the food reserve in hot, dry conditions; feeding might occur from time to time, and ovarian development be suspended in as many as 30% of the resting females. This combination of physiological manifestations defines " partial quiescence ".

Tabular matter and the discussion provide a useful consideration of recorded data on the physiological state of anophelines surviving hot, dry seasons by some such specialized form of resting, or aestivation. *D. S. Bertram*

HENDRICKSE, R. G. & KING, M. A. R. **Anaemia of Uncertain Origin in Infancy.** *Brit. Med. J.* 1958, Sept. 13, 662–9, 5 figs. [21 refs.]

In the practice of the Department of Paediatrics, Ibadan, Nigeria, most cases of anaemia, it is here reported, occur in association with conditions such as kwashiorkor, cancrum oris, tuberculosis and chronic sepsis. Sickle-cell anaemia is also relatively common but, especially during the first two years of life, many patients also present with severe anaemia unassociated with other recognizable diseases and it is with 24 such patients of an average age of 9½ months that this paper deals.

After admission 23 of the 24 were given 150 mgm. chloroquine base twice daily for 3 days; the remaining infant was treated with mepacrine. The liver was palpable in 16 of the patients, the spleen was enlarged in 19, *Plasmodium falciparum* were found in the blood of 13 and 4 possessed the sickling trait. Bone marrow maturation curves showed either a normal pattern or patterns similar to those found in iron deficient anaemia or in congenital haemolytic anaemias. The serum albumin value in 12 of the patients was 3·24 gm. per 100 ml. serum and the comparable globulin value was 3·62. Thymol turbidity tests performed on 16 patients gave high readings, the average being 7·7 units.

2 patients died shortly after admission, the remainder responded satisfactorily both generally and haematologically to the antimalarial treatment and in some instances to blood transfusion.

It is concluded that in infants in Ibadan if malnutrition is excluded malaria is the commonest cause of severe anaemia. [This is a good paper and the work has clearly been carefully done. It is important to note that the patients were all no more than 21 months old; all but 2 were infants and those with obvious malnutrition were excluded from the series. Some statements which occur in the paper and which on superficial reading might be thought to apply to anaemia in childhood in general must be interpreted in this context.]

*A. W. Woodruff*

SAMIOS, C. J. **Malaria among Troops in the Field. Clinical Experiences in the Far East.** *U.S. Armed Forces Med. J.* 1958, Dec., v. 9, No. 12, 1753–8, 1 fig.

A body of U.S. Marines, stationed in the malaria-free island of Okinawa, carried out manoeuvres on the island of Luzon in the Philippines, in an area where malaria is endemic. In the local civil population there is an equal incidence of *P. falciparum* and *P. vivax* infections, the vector mosquito being *Anopheles minimus flavirostris*. About half the strength of the Third U.S. Marine Division took part in an exercise on Luzon between 29th November and 8th December 1957 and the whole force of some 10,000 men from 27th February to 17th April 1958. A base unit of some 500 men remained continuously in the area from 27th October until 17th April 1958.

Antimalarial precautions comprised:—

(a) a weekly prophylactic dose of chloroquine of 500 mgm. [presumably expressed as the salt] begun 1–2 weeks before arrival and continued for 2 weeks after departure;

(b) mosquito-nets at night where practicable, otherwise protective clothing, consisting of head veils, long buttoned-up sleeves and " bloused trousers " [the abstracter suggests that this means that the lower ends were enclosed in gaiters];

(c) mosquito repellent to be applied every 4 hours at night;

(d) insecticidal sprays, for use inside tents and huts.

Prophylaxis was disrupted for one week owing to damage by a typhoon.

After the return of the Division to Okinawa, 47 cases of malaria occurred between 1st March and 15th May 1958. On the latter date the whole Third Division was placed on a " blanket treatment " comprising a single dose of 1 gm. of chloroquine [presumably expressed as the salt] and primaquine, 15 mgm. of the base daily for 2 weeks.

In this study there could be no unprotected control group and no long-term follow-up was practicable. Every patient came under treatment at an early stage when his illness was still mild and no regular periodicity of fever had developed. The first patient fell ill 14 days after arriving in Luzon and the last 113 days after leaving the malarious area. In 38% of cases the author considered that an unrelated illness had precipitated the overt attack of malaria. Infective mononucleosis (5 instances), infective diarrhoea (4 instances) and respiratory infections (4 instances) were the most common of these. In 2 patients giant urticaria was the premonitory symptom and was probably directly attributable to a plasmodial antigen. The spleen became palpable in 29% of patients.

Treatment followed conventional lines. In *P. vivax* infections chloroquine 1 gm. [presumably expressed as the salt] was given initially, followed by 0·5 gm. after 6 hours and thereafter 0·5 gm. daily for 3 days. Concurrently primaquine, 15 mgm. of the base, was given daily for 14 days. [The author states that 2 patients with *P. falciparum* infections were treated but does not state specifically what treatment they received.]

Discussing the suppressive action of chloroquine, the author quotes GOODMAN and GILMAN (*The Pharmacological Basis of Therapeutics*, 1955. New York: The MacMillan Co.) as stating that 2 doses taken at a week's interval will suppress malaria infections for " several weeks " to " many months ". He notes

however that 50% of the patients developed their first symptoms within 24 days of the last issue of the drug, and 8 patients within 1 week of this date.

[An estimation of infectivity of the local vectors and of the endemicity of malaria in the local population would have been informative.] *J. H. Walters*

ZELLER, R. W. & DEERING, D. **Corneal Complication of Chloroquine (Aralen) Phosphate Therapy.** *J. Amer. Med. Ass.* 1958, Dec. 27, v. 168, No. 17, 2263–4, 1 fig.

"Ten patients exhibiting discrete opacification of the corneal epithelium were taking chloroquine (Aralen) phosphate for arthritis or lupus erythematosus. The changes appear to be reversible on cessation of the drug therapy. Not all patients complained of visual problems but all showed corneal abnormalities with the biomicroscope. Some noted haloes around lights, a symptom which may lead to a mistaken diagnosis of glaucoma."

JONES, S. A. **Mass Treatment with Pyrimethamine. A Study of Resistance and Cross Resistance resulting from a Field Trial in the Hyperendemic Malarious Area of Makueni, Kenya. September 1952–September 1953.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1958, Nov., v. 52, No. 6, 547–61, 3 figs.

This detailed paper reports the result of a field trial of pyrimethamine as a mass malarial prophylactic by administration at intervals of 6 months. The experiment was carried out at Makueni Settlement, in Kenya, situated 90 miles from Nairobi at a height of 3,750 feet. The district experiences two periods of rainfall, October–December and March–May, amounting to 21 inches in the year under review, and is one in which infections with *P. falciparum, P. malariae* and *P. vivax* are hyperendemic, the vectors being *Anopheles gambiae* and *A. funestus*.

The dosage schedule used was as follows:—

| Age | Amount |
|---|---|
| 0–3 months | $\frac{1}{8}$ tablet = 3 mgm. |
| 4 months | $\frac{1}{4}$ tablet = 6 mgm. |
| 5–12 months | $\frac{1}{2}$ tablet = 12·5 mgm. |
| 1–$1^{11}/_{12}$ years | 1 tablet = 25 mgm. |
| 2–$4^{11}/_{12}$ years | $1\frac{1}{2}$ tablets = 37·5 mgm. |
| 5–$9^{11}/_{12}$ years | 2 tablets = 50 mgm. |
| 10–$14^{11}/_{12}$ years | 3 tablets = 75 mgm. |
| 15 upwards | 4 tablets = 100 mgm. |

[Though the text suggests that the highest dose of 4 tablets was given to those under 20 years it appears that this dosage was given to all adults.]

The design of the experiment was somewhat complex, for it incorporated:

(a) an investigation of a representative group of adults and children below 5 years of age, who received only a single dose at 0, 6 and 12 months, and

(b) a group of schoolchildren, initially 297 in number, who were treated at month 0, then monthly from month 4 to month 12, when the experiment was terminated. An additional complication was supplied by the administration of a therapeutic dose of amodiaquine (camoquin) to all schoolchildren who still showed a parasitaemia at month $6\frac{1}{4}$, and by the use of this drug in all children who had become seriously ill with malaria during the course of the experiment. [This measure was clearly unavoidable.]

Blood films were taken monthly and were personally examined by the author after staining with Giemsa, parasite densities being recorded arbitrarily from + to + + + + according to the proportion of fields, out of a total of 200, in which plasmodia were seen under the $^1/_{12}$″ objective.

The outstanding result of this experiment was the emergence of pyrimethamine-resistant variants of *P. falciparum* in 30·7% of the remaining 221 schoolchildren at the 12th month. The initial incidence of *P. falciparum* parasitaemia had been 33%, which declined in month 3 to 0·3%, after which it showed a progressive rise to 27% at month 12. [The abstracter quotes from Fig. I (c), the final figure of 30·7% being derived from the text.] It is of great interest that one child carried a strain of *P. falciparum* which appeared resistant to pyrimethamine *ab initio,* though prior exposure to this drug, but not to proguanil, was excluded. The high resistance of the mutant strains which emerged was demonstrated by their ability to persist in the blood despite a course of 6 daily administrations of the standard, sub-toxic, dose of the drug. Cross-resistance to proguanil was evident, but to a much lesser degree.

The administration of pyrimethamine to patients subsequently shown to be carrying sensitive strains of *P. falciparum* evoked a high though transient outburst of gametocyte production: in resistant strains further dosage produced no such effect.

The development of pyrimethamine resistance in infections with *P. malariae* proved to be rare. The incidence of this infection in the schoolchildren, which was initially 17%, fell to 0·3% at month 1, rose only to 4% at month 4 and thereafter declined to between 0·3 and 1·7% during the period of monthly drug administration.

Pyrimethamine resistance to *P. vivax* infections developed to an equally insignificant degree, the incidence of this parasite in the schoolchildren being 10% initially, 0% at month 1, 4% at month 4 and varying between nil and 1·2% during the monthly dosage period. Though it is not stated that the scanty persistent *P. vivax* infections were tested against a daily dose of pyrimethamine, as was done in the case of resistant *P. falciparum* infections, the author considers that there was no evidence of the emergence of resistant variants.

It is clear that the employment of pyrimethamine prophylaxis at intervals of 6 months will result with certainty in the emergence of highly resistant mutants of *P. falciparum* whose incidence will rapidly build up in the population at risk. In addition, a proportion of these will show cross-resistance to proguanil. *P. malariae* and *P. vivax* probably possess the ability to develop resistant mutants only to an insignificant degree.

[The abstracter regrets his inability to give more than the broad outline of the results obtained in this important experiment, and advises those interested to consult this complex paper in the original.]

[See also this *Bulletin,* 1958, v. 55, 733, 1075.] *J. H. Walters*

REHM, W. F., GARMS, R. & WEYER, F. Zur Nachwirkung von Dieldrin bei *Anopheles*-Larven. [**Delayed Effect of Dieldrin on** *Anopheles* **Larvae**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1958, v. 9, No. 3, 200–204.

In experiments with fourth stage larvae of *Anopheles maculipennis atroparvus, A. stephensi* and *A. gambiae* exposed to 0·002 or 0·005 p.p.m. dieldrin, it has been confirmed that the action of this insecticide is two-fold: apart from its immediate effects, there may be considerable mortality in the later stages of the life history, some days after exposure has been stopped [see SHIDRAWI, this *Bulletin*, 1958, v. 55, 703]. Larvae, pupae and adults were all affected, the adults particularly on emerging. Adult mortality was especially high. In all three species it exceeded the figure for larval mortality due to the immediate effect of the insecticide. *R. J. Wood*

D'ALESSANDRO, G. & MARIANI, M. Selezione di ceppi di *Anopheles atroparvus* resistenti al DDT. [**Selection of Strains of** *Anopheles atroparvus* **Resistant to DDT**] *Riv. di Parassit.* Rome. 1958, July, v. 19, No. 3, 215–24, 1 graph. [14 refs.] English summary.

A laboratory stock of *Anopheles atroparvus* was submitted to DDT in 4 ways and the resulting stocks were compared cytogenetically by measuring the LD50 by means of the Busvine and Nash technique. Stock I was derived by exposure to DDT of the first and third stage larvae, stock II by exposure during the whole aquatic cycle, stock III from adults, the females being those surviving 2% DDT and the males 1% DDT. In each case the LD50 of the third generation of the treated stocks was slightly higher than the original non-treated stock. An examination of the chromosomes demonstrated the favouring of the inverted arrangement in the selected stocks.

Stock IV was obtained from females treated as in Stock III with males from the Stock II treatment. In the twelfth generation of this stock the tolerance to the insecticide both in the adult females and the larvae was much greater than any of the other stocks. Again the inverted chromosomal order was found to be favoured.

A stock V is being formed, homozygous for the standard order of the chromosomes, and selection as for stock IV exercised.

It was noticed that there was a seasonal variation in the level of resistance: a slight raising of tolerance corresponding to the natural prehibernation period was found, even though the insects were maintained at a constant temperature and relative humidity. *C. Elizabeth Jackson*

SMITH, A. **Effect of Residual House Spraying in the Plains on Anopheline Densities in Huts on the Pare Mountains.** [Correspondence.] *Nature.* 1959, Jan. 17, v. 183, 198–9.

A steep escarpment divides the Pare area of Tanganyika into two parts, malarious plains and a mountain region at 2,000–4,000 feet, in which malaria transmission is seasonal at most. Hut spraying with dieldrin, in plains villages only, has been performed at 8-month intervals for 3 years. *Anopheles funestus*

has not been found in huts since shortly after spraying began; *A. gambiae* densities have been reduced considerably. In mountain villages anopheline spray catches have been almost invariably negative since residual spraying commenced. As only the plains villages were treated, the findings suggest that the former presence of *A. gambiae* and *A. funestus* in huts on the mountains was dependent on direct infestation from the plains, and to some extent seasonal reinfestation of mountain breeding sites. Strong winds, blowing up the valley towards the escarpment, are chiefly responsible. *B. B. Waddy*

ARMSTRONG, J. A. **The Susceptibility of Adult Female *Anopheles gambiae* to Insecticides in East Africa.** *Bull. World Health Organization.* Geneva. 1958, v. 19, No. 6, 1105–9.

Tests on the susceptibility of adults of *Anopheles gambiae* to DDT, gamma BHC and dieldrin were made by the Busvine-Nash technique, as it was before its standardization in detail and kit by WHO, for several localities in East Africa which had been sprayed, or were unsprayed. Tables set out the mortalities, at serial concentrations of each insecticide, as found in representative field strains and in a normal laboratory colony. There was no evidence of resistance in the strains tested, the LC50 values ranging between 0·42 and 0·88% (DDT), 0·0039 and 0·006% (gamma BHC) and 0·02 and 0·15% (dieldrin). Dieldrin-resistance did not occur in the areas of the Taveta-Pare Malaria Control Scheme nor in the Nandi Malaria Control Scheme, where sprayings had been in progress for 3 years. *D. S. Bertram*

GRAMICCIA, G., DE MEILLON, B., PETRIDES, J. & ULRICH, A. M. **Resistance to DDT in *Anopheles stephensi* in Southern Iraq.** *Bull. World Health Organization.* Geneva. 1958, v. 19, No. 6, 1102–4.

In southern Iraq LC50 levels for DDT susceptibility of *Anopheles stephensi* were much greater than 2% when tested in October–November 1957, in three localities. Two of these had histories of anti-adult DDT-sprayings since at least 1956, supplemented by antilarval spraying since about 1947 in one place, but the first use of DDT in the third locality (Al Zeiad) as an anti-adult spray was only 6–7 months before these tests were made. No *A. stephensi* from untreated areas of Iraq were available to give comparative data, but 0·5% is an unpublished LC50 for this species in Saudi Arabia. Al Zeiad was at least 15 kilometres away from the nearest places known to have had residual sprayings.

The mosquito population was possibly in an autumnal phase which conferred high tolerance to DDT, but this was certainly not a hibernation state as adult physiology and breeding were observed to be normal. The larvae survived 5 p.p.m. of DDT. This apparent rapid development of DDT resistance within a few months is alarming. Both adults and larvae were highly susceptible to dieldrin (LC50 about 0·1% and over 0·004 p.p.m. respectively). They were also susceptible to gamma BHC. Results of tests on adults and larvae are tabulated in detail. *D. S. Bertram*

MARTINEZ PALACIOS, A. Resistencia fisiologica al dieldrin en Mexico de *A.* (*A.*) *p. pseudopunctipennis* Theobald 1901. [**Physiological Resistance of** *Anopheles p. pseudopunctipennis* **to Dieldrin in Mexico**] *CNEP Bol.* Mexico. 1958, July–Sept., v. 2, No. 3, 18–31. English summary.

Despite annual indoor sprayings since 1945 with DDT, 822 malaria cases still occurred in one year recently in the Temixco area in Mexico. Two DDT sprayings were then made in 1957, and one with dieldrin early in 1958. Standard WHO tests for the susceptibility of the vector in the area (*Anopheles pseudopunctipennis pseudopunctipennis*) to DDT and to dieldrin gave LD50 values, in September 1957, of less than 0·25% (DDT) and less than 0·1% (dieldrin). But, by July 1958, dieldrin resistance was high and DDT tolerance slightly increased —LD50 values not directly measureable for dieldrin and 1·2% for DDT. Other localities in the area were also studied in this respect, and also other regions of the country including places where *A. albimanus* was the vector.

It is reported that where high dieldrin-resistance was found, the mosquitoes (*A. p. pseudopunctipennis*) entered houses if dieldrin had been the only insecticide used. If DDT had been used before dieldrin, the houses were not invaded ("*no están invadidas*"). [Although by no means clearly said, the inference appears to be, elsewhere in the text, that a contact repellence by traces of DDT still active through the dieldrin deposit caused the mosquitoes to leave these houses (*cf.* also this *Bulletin,* 1959, v. 56, 275). If so, the phrase "not invaded" is misleading.] This effect of DDT is happening about 12 months after it was deposited. In towns sprayed only with DDT, the mosquitoes were susceptible to DDT and to dieldrin, although in one town vigour tolerance to DDT had developed.

In some places where only dieldrin had been used against *A. p. pseudopunctipennis* it was still susceptible physiologically, with indications that after 12 months the deposit itself was no longer satisfactory.

*A. albimanus* proved susceptible to DDT and to dieldrin. There is again some indication of dieldrin deposits being unsatisfactory, after 8 months.

It is noted that the towns where dieldrin resistance was found in *A. p. pseudopunctipennis* were near breeding places in rice fields; the significance of this fact is queried but not defined.

A laboratory colony of *pseudopunctipennis* resistant to dieldrin was started, the increased readiness of the resistant females to feed on man and laboratory animals in captivity and their greater longevity, compared with susceptible mosquitoes, being helpful in this development. *D. S. Bertram*

OMARDEEN, T. A. **Resistance of** *Anopheles aquasalis* **Curry to Dieldrin in Trinidad.** [Correspondence.] *Nature.* 1959, Jan. 10, v. 183, 131.

The author, from Trinidad, refers to the genetics of resistance of *Anopheles gambiae* to dieldrin [this *Bulletin,* 1957, v. 54, 124] and describes experiments with the same technique applied to *Anopheles aquasalis* from the Barataria area of Trinidad.

354 mosquitoes were exposed in 14 WHO kit tubes to standard 0·4% dieldrin-impregnated papers for 1 hour and held for 24 hours. There were 339 survivors and these were similarly re-exposed. There were now 290 survivors; that is

81·9% were apparently unaffected by the insecticide. Of 56 control mosquitoes in 2 tubes exposed similarly to papers impregnated only with risella oil, 48 survived.

3 days after the first test began, it was repeated with paper impregnated with 4% dieldrin. Of 377 mosquitoes 182 (48·3%) survived: 52 of the 56 control mosquitoes survived.

It would seem that over 40% of the mosquitoes tested were homozygous for resistance to dieldrin. *H. J. O'D. Burke-Gaffney*

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## TRYPANOSOMIASIS

*In this section abstracts are arranged as far as possible in the following order:*—African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

DAVEY, D. G. **Human and Animal Trypanosomiasis in Africa.** *Amer. J. Trop. Med. & Hyg.* 1958, Sept., v. 7, No. 5, 546–53. [22 refs.]

This is a general discussion of trypanosomiasis in man and his domestic stock. The area of Africa occupied by tsetse is almost 4,000,000 miles, larger than the United States of America, and consequently its climate, vegetation and topography show great variations. There is also a diversity of trypanosomes causing disease and of *Glossina* vectors. The epidemiology of human and animal trypanosomiasis is influenced by the preference of the individual species of flies for different types of woodland, *e.g.*, species inhabiting evergreen forest rarely come in contact with man or stock.

Referring to the characteristics of the various trypanosome species, the author records that the strain of *Trypanosoma vivax* established and maintained in rats in West Africa was passaged by him in mice for 4 years, and was then found to be no longer infective to cattle, whereas *T. congolense* from cattle maintained in mice for 12 years continuously infected cattle readily.

Though *T. rhodesiense* can be conveyed by the tsetse from game to man this rarely happens because man rarely stays in areas where his cattle die and hence moves away from contact with *G. morsitans*. Moreover, man is not a preferred host of this fly species and if he does contract *T. rhodesiense* he quickly becomes ill, retires to his hut and loses contact with the vector.

In *T. gambiense* infections the vectors readily feed on man, and their habitats keep them in frequent contact with man. Further, the benign and protracted first stage of sleeping sickness results in man being an effective reservoir of infection. The evidence does not suggest an animal reservoir of this trypanosome though cyclical transmission through animals has been obtained.

Human trypanosomiasis is no longer a major disease and its importance is diminishing as a result of mass treatment and fly control. Control of trypanosomiasis in cattle is difficult but continued attack and patience will solve the problem. *T. H. Davey*

ORMEROD, W. E. **A Comparative Study of Cytoplasmic Inclusions (Volutin Granules) in Different Species of Trypanosomes.** *J. General Microbiol.* 1958, Oct., v. 19, No. 2, 271–88, 10 figs. on 3 pls. & 3 text figs. [42 refs.]

This paper is devoted to a study of cytoplasmic inclusions, commonly known as " volutin granules ", which occur in the blood forms of various species of trypanosomes. After discussing previous work relating to the nature of these inclusions in diverse protozoa, the author describes his own observations on trypanosomes, examined alive by phase-contrast microscopy as well as in Giemsa-stained preparations. Altogether 16 species were used in this work: *Trypanosoma lewisi, T. duttoni, T. grosi, T. evotomys, T. acomys, T. cruzi, T. nabiasi, T. avium, T. vivax, T. congolense, T. simiae, T. brucei, T. rhodesiense, T. gambiense, T. rotatorium,* and *T. danilewskyi.*

Most of the trypanosomes of warm-blooded animals contain inclusions in the form of spherical refractile bodies measuring up to 4$\mu$ in diameter, and varying in number and position in different species and stages. In species of the *lewisi* group they are usually situated near the kinetoplast, but in the *brucei* group they are mostly anterior to the nucleus, arranged in the form of strings of beads. In some species (*e.g., T. lewisi, T. cruzi*), the inclusions do not stain by Giemsa's method, in others (*e.g., T. nabiasi, T. grosi*) they do, while in *T. rhodesiense* their staining reactions are variable. The inclusions are not permanent structures but make their appearance in the course of the development of the trypanosomes. The results of this work indicate that the inclusions are connected with the immune reaction of the host. Thus, in *T. rhodesiense* their maximum number was reached in chronic infections, while in *T. lewisi* their appearance coincided with inhibition of reproduction by ablastin.

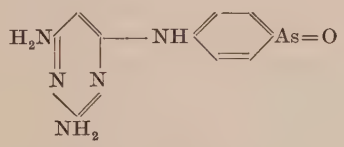
There is also a correlation between polymorphism of the trypanosomes and the development of the inclusions. The latter appear in the broad and stumpy forms of *T. rhodesiense* and *T. lewisi,* which are said to be associated with the immune reaction of the host, whereas in the slender forms inclusions are either absent (*T. rhodesiense*) or represented by a single body (*T. lewisi*).

The appearance and arrangement of the cytoplasmic inclusions in different species of trypanosomes are depicted in a series of free-hand drawings.

*C. A. Hoare*

BAKER, J. R. **The Curative Power of 4-(2:6-Diaminopyrimidin-4-Ylamino) Phenylarsine Oxide (Compound 12,065) in Infections of** *Trypanosoma rhodesiense* **in Laboratory Animals.** *Brit. J. Pharmacol. & Chemotherapy.* 1958, Dec., v. 13, No. 4, 436–9.

The author has investigated the toxicity to laboratory animals and the effect on *Trypanosoma rhodesiense* infections of the substance named in the title which has the following constitution.




The LD50 doses are recorded for rats, mice and monkeys. The intramuscular CD50 was determined in mice for two strains of *T. rhodesiense* recently isolated

from human patients and for another strain of the same parasite which had been kept by cyclic passage in the laboratory for 1½ years. The efficiency of the above-named drug was also compared with that of the melarsen oxide—BAL (Mel B) of FRIEDHEIM [this *Bulletin,* 1949, v. 46, 711]. Rats and mice were infected intraperitoneally with blood from a donor animal and the course of infection was followed in blood smears from the animals' tails. Both drugs were given intramuscularly when infection became apparent. Mice were considered cured when trypanosomes remained absent from the blood for 42 days.

It was found that the two freshly isolated strains required more drug for cure than did the older strains, the CD50 values being respectively 6 mgm. and 2 mgm. per kgm., whereas AINLEY and DAVEY [*ibid.,* 1959, v. 56, 20] had previously found that the CD50 for compound 12,065 in an old syringe-passage strain of *T. rhodesiense* was about 0·25 mgm. per kgm. when given subcutaneously.

For various reasons the author considers that the discrepancy in results is due to the age and manner of passage of the trypanosome strains used. The curative power of compound 12,065 and of the melarsen oxide—BAL compound was approximately the same. The question which is the more effective in treatment of human patients is still *sub-judice.* *J. D. Fulton*

SMITH, I. M. **The Protection against Trypanosomiasis conferred on Cattle by Repeated Doses of Antrycide, alone or with** *Trypanosoma congolense.* *Ann. Trop. Med. & Parasit.* 1958, Dec., v. 52, No. 4, 391–401, 1 fig. [14 refs.]

STEPHEN, L. E.; WILLIAMSON, J. **Suramin Complexes. IV.—Ethidium Bromide Complex: a Large-Scale Laboratory Trial of its Prophylactic Activity in Cattle** [STEPHEN]. *Ann. Trop. Med. & Parasit.* 1958, Dec., v. 52, No. 4, 417–26, 2 figs. **V.—Ethidium Complex: Attempts to Overcome the Injection-Site Reaction in Cattle** [STEPHEN & WILLIAMSON]. *Ibid.,* 427–42, 1 diagram. [20 refs.]

See this *Bulletin,* 1958, v. 55, 638.

CANTRELL, W. **Mutation Rate and Antigenic Variation in** *Trypanosoma equiperdum.* *J. Infect. Dis.* 1958, Nov.–Dec., v. 103, No. 3, 263–71.

ADLER, S. **The Formation of Septa during Development of Trypanosomes.** [Miscellanea.] *Ann. Trop. Med. & Parasit.* 1958, Dec., v. 52, No. 4, 519.

The author has recently shown [this *Bulletin,* 1959, v. 56, June] that *Trypanosoma cruzi* produces syncytial masses which may be traversed by fine septa on a medium containing immune serum. He points out that SHORTT and SWAMINATH [*ibid.,* 1932, v. 29, 471] had recorded the presence of fine fibrils traversing the cysts formed in *Trypanosoma phlebotomi* during its development in the midgut of the sandfly *Phlebotomus babu* var. *shortti*; these fibrils were lying between and separating nucleated masses. This phenomenon is part of

the life cycle of *T. phlebotomi* in the sandfly and seems to be independent of the presence of immune serum. No such finding has been recorded in the life cycle of other trypanosomes. *T. phlebotomi* has affinities with trypanosomes of cold-blooded animals and differs morphologically from *T. cruzi* and other mammalian species.

As far as is known fibrils in *T. cruzi* are formed in syncytia only *in vitro* in the presence of specific serum: there is nothing to indicate their presence in the life cycle of this trypanosome in its hosts, vertebrate or invertebrate, at any stage.

*H. J. O'D. Burke-Gaffney*

HIDALGO, R. Trypanosomiasis americana en el Perú. Observaciones entomológicas en el departamento de Tumbes. [**Entomological Studies on Chagas's Disease in the Tumbes Area, Peru**] *Rev. Med. Exper.* Lima. 1957, Dec., v. 11, Nos. 1/2, 71–85, 1 folding map & 6 figs. on 2 pls. [10 refs.] English summary.

Endemic centres of Chagas's disease in Peru are known in the south-west and also in the north-east of the country, the vectors being, respectively, *Triatoma infestans* and *Panstrongylus herreri*. The present paper reports on observations in north-west Peru, in the Tumbes and Zarumilla departments, where *P. chinai*, *P. rufotuberculatus* and *T. dimidiata* occur. The last species, a vector in contiguous Ecuador, was markedly domestic in habit and the predominant species, feeding readily on human beings but negative for *Trypanosoma cruzi* in the faeces or gut of 352 specimens examined. Gregarines were seen in the malpighian tubes of 26 specimens. The fewer *P. chinai* examined were also negative for *T. cruzi*; this species also seemed fairly domesticated. No evidence is offered that Chagas's disease is present in these regions. More localities along the Tumbes river were bug infested (65%) than along the Zarumilla river (15%). Photographs illustrate the thatch-roofed and straw-walled houses infested, those of Zarumilla being better ventilated generally. Photomicrographs are given of the gregarines free and in malpighian tubes.

*D. S. Bertram*

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## LEISHMANIASIS

*In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.*

HEISCH, R. B. **On *Leishmania adleri* sp. nov. from Lacertid Lizards (*Latastia* sp.) in Kenya.** *Ann. Trop. Med. & Parasit.* 1958, Mar., v. 52, No. 1, 68–71, 2 figs.

*Phlebotomus clydei*, a sandfly inhabiting gerbil burrows in Kenya, had previously been found infected with leptomonad flagellates [this *Bulletin*, 1955, v. 52, 520]. Since in Central Asia gerbils are reservoirs of leishmaniasis [*ibid.*, 1944, v. 41, 331], the occurrence of infected sandflies in gerbil burrows in Kenya might have been similarly interpreted if it were not for the fact that the

burrows in question had been abandoned by the rodents and were actually occupied by lizards, *Latastia longicaudata revoili*. From their blood a *Leishmania*—closely resembling the sandfly flagellates—was recovered in NNN cultures, though parasites were not seen in blood films or sections and smears from any of the organs of infected lizards.

A detailed description—illustrated by figures—is given of the lizard flagellates in culture, and it is noted that they differ in appearance and behaviour from local strains of *L. donovani*. The flagellates in *Phlebotomus clydei* closely resemble the cultural forms of the lizard leishmaniae, and in view of the association of these sandflies with the lizards in burrows and the finding of nucleated erythrocytes in their guts, it is concluded that *P. clydei* is the vector of the lizard parasite, which is named *L. adleri* sp. n.

Since the determination of vectors of human leishmaniasis has sometimes been based on feeding experiments with wild sandflies, which might harbour natural infections with reptilian leishmaniae, the author emphasizes the importance of using laboratory-bred insects for this purpose. *C. A. Hoare*

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## FEVERS OF THE TYPHUS GROUP

*In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.*

MITEREVA, V. G. **Experimental Use of Fluorescence Microscopy in the Study of Rickettsia.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1958, v. 29, No. 5, 674–7. [Translated from Russian.]

PSHENICHNOV, A. V., SHEVELEVA, O. N. & NOSKOVA, E. G. **Variability of *Rickettsia prowazeki* and Prospects of obtaining Live Typhus Vaccine.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, Nos. 7/8, 935–8. [Translated from Russian.]

A strain of *Rickettsia prowazeki* which had been maintained exclusively in lice (440 passages) at a constant temperature of 31–32°C. for 12½ years was found to have become avirulent for guineapigs. Toxicity for mice had decreased about 10-fold and anti-leucocytic activity about 3-fold. The morphology of the rickettsiae was typical, but the property of capsule formation had been lost. Guineapigs developed agglutinins (titres of 1 in 40 to 1 in 320) and complement-fixing antibody (1 in 64 to 1 in 512) when inoculated with material from infected lice in doses as low as one-tenth of the contents of an infected louse; all these animals resisted challenge with a virulent strain. It was not possible to infect lice from the blood of guineapigs which had received large doses of the avirulent strain.

It is concluded that prolonged exposure to unfavourable factors can be used to reduce the virulence of *R. prowazeki* and that the method selected by the

authors for obtaining a live typhus vaccine has promise. But "it is yet early to transfer to human beings the conclusions from experiments on guinea-pigs".

*R. S. F. Hennessey*

SOMOV, G. P., SHAPIRO, M. I. & PETROV, A. A. **Study of an Island Focus of Northern Asian Tick-borne Typhus.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1958, v. 29, No. 5, 761–6, 3 figs. [19 refs.] [Translated from Russian.]

Febrile illnesses resembling tick-borne typhus have been observed on an island of southern Primor'e, about two-thirds of the patients having a necrotic lesion at the site of a tick bite. An erythematous papular rash appeared on the body and limbs between the 3rd and 6th day of illness, lasting 6–7 days. The Weil-Felix reaction with *Proteus X19* was negative in most cases.

The rodent and tick fauna of the island was surveyed and attempts were made to isolate rickettsiae from ixodiid ticks. Two strains of rickettsiae were eventually derived from pooled suspensions of *Haemaphysalis concinna* collected from vegetation. Guineapigs inoculated intraperitoneally showed a marked scrotal reaction. The sera of infected guineapigs and rabbits gave positive complement-fixation tests with *Rickettsia sibiricus* antigen only; rabbit sera agglutinated *Proteus OXK* at titres of 1 in 40 and 1 in 80 and *Proteus OX19* and *OX2* at titres not exceeding 1 in 20. A laboratory worker accidentally contracted a typical infection from guineapig material; his serum gave a positive complement-fixation test (titre of 1 in 320 on the 36th day) to *R. sibiricus* antigen and agglutinated *Proteus OXK, OX19* and *OX2* at titres of 1 in 160, 1 in 40 and 1 in 40 respectively.

It is concluded that the febrile illnesses on the island are related to Northern Asian tick-borne typhus, caused by rickettsiae resembling *R. sibiricus* in their biological and antigenic properties.

*R. S. F. Hennessey*

KOTSINIAN, M. E. **Q Fever in the Armenian S.S.R.** *Problems of Virology.* London. 1958, v. 3, No. 2, 109. [Translated from Russian.]

Q fever was first detected in human beings in the Armenian S.S.R. in 1954 when sera from 17 of 52 persons in a meat-packing station were positive in the complement-fixation test for *Rickettsia burneti,* some of them with rising titres.

One of 5 sheep examined was also positive, but as 22 sera from 213 head of cattle and small ruminants imported from Turkey were also positive, it is possible that Q fever had been imported.

In 1956 an outbreak occurred among 62 persons in a village in the Alaverd area and lasted for about 3 weeks. The complement-fixation test was positive in 15 of 22 sera examined, some with rising titres. 8 of 99 head of cattle were also positive. A human case of Q fever was also found in another village in the same area.

In the Agin area, positive complement-fixation tests were obtained with 1 bovine serum among 17 head of cattle and 16 pigs examined. In the Oktember'ian area, 5 of 228 head of cattle were positive.

The author concludes that the results obtained in these three areas show that Q fever in Armenia is of an epidemic character.

*H. J. O'D. Burke-Gaffney*

KORDY, M. I. **The Micro-Complement Fixation Test as applied to the Diagnosis and Incidence of Q-Fever in Egypt.** *J. Egyptian Med. Ass.* 1958, v. 41, Nos. 7/8, 325–33.

The author used the micro method of complement fixation as used by HENNESSEN [*Bull. Hyg.*, 1956, v. 31, 110 *bis*] for diagnosis of virus diseases to ascertain the incidence of Q fever in Egypt. Sera from 50 sheep gave 20% positive results and 18% suspicious. Sera from 77 camels gave 11·68% positive results and 6·49% suspicious. Sera from 114 people of various ages were examined. Of these, no positive results were obtained from children under 10 years of age; in the age-group 10 to 20 years 2·50% were positive and in the age-group above 20 years 6·15% gave a positive result. The author concludes that Q fever is endemic in Egypt and that animals are affected more than human beings. *P. A. Clearkin*

PAVILANIS, V., DUVAL, L., FOLEY, A. R. & L'HEUREUX, M. **An Epidemic of Q Fever at Princeville, Quebec.** *Canadian J. Pub. Health.* 1958, Dec., v. 49, No. 12, 520–29, 1 graph. [16 refs.]

An outbreak of illness among workers in the abattoir in Princeville, a small town of 2,700 inhabitants 60 miles from Quebec City, proved to be Q fever. These were the first reported cases of Q fever in the province. The outbreak was explosive and was strictly limited to the abattoir workers and the employees engaged in handling the meat and meat products. There were no cases among clerks, works or administrative staff nor among the members of the families of those affected. Neither were any of the nurses who attended the patients in hospital or any of the staff who treated the patients affected. All attacked were males as none of the female staff were engaged in handling meat or its products. The epidemic lasted 17 days.

Several arthropods in the province can be vectors of Q fever. *Rickettsia burneti* was found by direct examination in the excreta of 4 of 10 specimens of *Melophagus ovinus* which is a sheep parasite and only accidentally feeds on man or other animal.

To determine if Q fever was endemic in the province cattle and sheep were tested for antibodies. The results showed that 9·9% of 1,341 cattle were or had been infected with *R. burneti*. A small number (91) of sheep in the province were tested and 59% proved to be positive. Thus it appears that Q fever is endemic in Quebec, but on account of the highly variable symptomatology clinical diagnosis is rather difficult. *P. A. Clearkin*

BABUDIERI, B. **Studies on the Microscopic Slide-Agglutination Test for Q Fever.** *Bull. World Health Organization.* Geneva. 1958, v. 19, No. 6, 981–94. [21 refs.]

The microscopic slide-agglutination test for *Rickettsia burneti* antibody [this *Bulletin*, 1955, v. 52, 623] is performed by mixing serum dilutions with purified rickettsial suspension on a glass slide, allowing the mixtures to react overnight in a moist glass chamber at room temperature, drying, staining with Giemsa, and examining for agglutination at a magnification of × 100–150. From results obtained with sera from 72 sheep which had been placed in contact with

an infected flock and studied over a 3-year period, the test appeared to be about 23 times more sensitive than the complement-fixation test and about 10 times more sensitive than either the macroscopic tube test or the capillary tube test. There was no evidence of decreased specificity and the test could be performed satisfactorily with an extract of a drop of dried blood on filter paper.

The titre of *R. burneti* agglutinin in human serum was not affected by heating the serum to 56°C. for 25 minutes; heating to 60–62°C. generally gave rise to a prozone phenomenon and sometimes to complete loss of agglutinating capacity. As a heat-labile agglutinin inhibitor, believed to be identical with complement, has been detected in fresh serum, heat inactivation [at 56°C.] before testing is indicated.

Although unnecessary for routine work, the sensitivity of the test could be enhanced by adding bovine serum and guineapig complement to take advantage of the conglutination effect. *R. S. F. Hennessey*

MEDUSKI, J. & ORŁOWSKA, B. **Changes in the Contents of Lecithin in the Yolk Sac of Fertilized Hen Eggs developing in Normal Conditions and after Infection with** *Coxiella burneti* **or** *Rickettsia prowazeki*. *Bull. Acad. Polonaise des Sci.* Warsaw. Sér. Sci. Biol. 1958, v. 6, Nos. 11/12, 455–62, 4 figs. [19 refs.]

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## YELLOW FEVER

*In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

WOLFF, J. W., COLLIER, W. A., DE ROEVER-BONNET, H. & HOEKSTRA, J. **Yellow Fever Immunity in Rural Population Groups of Surinam (with a Note on other Serological Investigations).** *Trop. & Geograph. Med.* Amsterdam. 1958, Dec., v. 10, No. 4, 325–31, 1 map. [11 refs.]

Although since 1908–09, when the last epidemic of yellow fever occurred in Surinam, no clinical cases of that disease had been reported in the territory, results published between 1935 and 1947 of immunity surveys in population groups in the forest zone and along the rivers showed the virus of jungle yellow fever to be still present in several areas of the hinterland [this *Bulletin*, 1947, v. 44, 993]. The results of further immunity surveys made since 1947 are provided in the present paper.

During the period now under review 611 serum samples, including 35 from various animal species, were submitted to mouse-protection tests, in the performance of which the intraperitoneal method of SAWYER and LLOYD [this *Bulletin*, 1932, v. 29, 198] was followed throughout. The results of the tests in human sera are grouped, where possible, according to race, sex and age; and in the age-groups a division is made between persons under and over 41 years old, respectively, because immunity in the latter group might have derived from an infection during the 1908–09 epidemic.

Sera obtained from 374 bush Negroes, 81 American Indians and 121 Creoles were examined. The results, in percentages, are summarized as follows, with findings for age and sex where these were available:

| | | | Males | | | | Females | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Race | No. Examined | % + | No. Examined | % + | Under 40 years % + | Over 40 years % + | No. Examined | % + | Under 40 years % + | Over 40 years % + |
| Negroes | 374 | 40·1 | 147 | 53 | 52·3 | 55 | 186 | 29 | 27·7 | 35·5 |
| Indians | 81 | 27 | 34 | 47 | 30 | 81·7 | 29 | 13·9 | 11·5 | 33·3 |
| Creoles | 121 | 31·4 | 80 | 40 | 25 | 54·5 | 41 | 12·2 | 4·5 | 21 |

Serum samples were collected from 2 Creole groups: the first inhabiting settlements in the savannah area and the second living in villages in the Marowijne region. In the first group, comprising 45 persons—27 males and 18 females—immunity was demonstrated in 18 (66·6%) of the males—in 7 (53·8%) of 13 under 41 years [in 6 (50%) of 12 between 16 and 40 years] and in 11 (78·5%) of 14 over 41 years—but in only 1 female—in 1 (12·5%) of 8 over 41 years. In explanation of these findings the authors suggest that, although no yellow fever seems to be present in the area of the settlements surveyed, it may well have been that the male members of this group once worked in a yellow fever area, while the high rate of immunity among those over 41 years might have been caused by an infection at an early age during the 1908–09 epidemic. In the second group, comprising 76 persons—53 males and 23 females—the immunity rates were 28·3% in males and 17·4% in females.

All neutralization tests with the 35 animal sera were negative, but this may be due to the fact that all the animals had been caught in the coastal zone near Paramaribo.

In conclusion the paper records the results of serological tests carried out at Paramaribo on a large number of human blood specimens collected during the yellow fever immunity survey. These specimens were tested by agglutination and complement-fixation tests for the presence of antibodies against *Salm. typhi,* rickettsiosis (*Proteus OXK* and *OX19*), brucellosis and treponematoses. Positive reactions were obtained: for typhoid in 6 out of 379 tests, for typhus in 1 out of 379, for brucellosis in none out of 49, and for treponematoses in 31 out of 168. *G. Stuart*

PANTHIER, R. & CARTEAUD, J. P. Recherche d'une méthode précise de titrage des anticorps par test de séroprotection. III. Variations du temps de contact et de la température du mélange virus-sérum *in vitro* avant l'inoculation. [**Investigation of a Precise Method of Titrating Antibody by the Serum Neutralization Test. III. Variations in Time of Contact and Temperature of the Virus-Serum Mixture *in vitro* before Inoculation**] *Bull. Soc. Path. Exot.* 1958, Mar.–Apr., v. 51, No. 2, 159–62, 1 fig.

In a continuation of previous studies on virus neutralization tests [this *Bulletin,* 1958, v. 55, 267] the authors have studied the neutralization of the Dakar strain of yellow fever virus by a horse immune serum during contact at room temperature for 20 minutes, and also by the standard WHO technique

[*ibid.*, 1958, v. 55, 393], which involves additional contact at 37°C. for 1 hour. The results are presented as a family of neutralization curves of the LD100, LD50 and LD0 obtained by the 2 procedures respectively, and show that the extent of neutralization is considerably increased by the additional period of contact at 37°C., particularly with low doses of virus. *D. J. Bauer*

See also p. 572, LAARMAN, **Research on the Ecology of Culicine Mosquitoes in a Forest Region of the Belgian Congo.**

PINTO SEVERO, O. Evolucion de la campaña anti-*aegypti* en los ultimos diez años. [**Progress of the Anti-*aegypti* Campaign in the Last Decade**] *Bol. Oficina Sanitaria Panamericana.* 1958, Nov., v. 45, No. 5, 375–86, 1 map. English summary.

The English summary appended to the paper is as follows:—

"A summary is first given of the progress achieved in the *Aëdes aegypti* campaign in the last ten years, with a description of major developments during that period. The status of the campaign in the individual countries and territories in the Americas is then reported. It is pointed out that Bolivia, Brazil, Chile, Ecuador, El Salvador, Honduras, Nicaragua, Panama, Paraguay, Peru, and Uruguay are among the countries, and British Guiana, British Honduras, French Guiana, Grenada, and Saint Vincent among the territories that have been declared, or will be declared, free of *A. aegypti*. A decision is also soon to be reached in Colombia, on completion of the inspection of certain areas where there is little probability that the mosquito exists. It is estimated that 80 per cent. of the *A. aegypti* problem has now been solved.

"The second part of the paper gives an analysis of the development of the campaign, the difficulties encountered, and the causes for delays in the progress of activities. Cited among those causes are lack of interest on the part of certain governments, *aegypti*-resistance to DDT as confirmed in certain areas, and insufficient financial support on the part of the governments and also of PASB. The proposal is made that a final effort be put forth, with greater technical and financial participation by both the governments and PASB, so that the campaign may be completed within the next four years.

"Finally, reference is made to the conditions under which a previously *aegypti*-infested country or area can be considered free of the vector, according to the eradication criterion established in the "Manual of Operations for an *Aëdes aegypti* Eradication Service". The paper describes the method of presenting the final report that declares the country, or part thereof, to be free of *aegypti* and establishes the commitment of maintaining full surveillance in ports and border areas for as long as any threat of reinfestation remains."

## RABIES

HUYGELEN, C. & MORTELMANS, J. La rage à virus Flury chez le cobaye et l'effet de la vaccination préalable au moyen de vaccin phéniqué. [**Rabies due to Flury Virus in the Guineapig and the Effect of Previous Vaccination by means of Phenolized Vaccine**] *Ann. Soc. Belge de Méd. Trop.* 1958, Aug. 31, v. 38, No. 4, 657–67, 2 figs. [11 refs.]

In the series of experiments described in this article Flury virus at its 45th egg-passage level (LEP) was employed.

In the first series the virus was inoculated into the hind-leg muscles of 3 groups of guineapigs: group A (100 animals) received per animal 1 ml. of a 40% suspension of infected chick embryo; group B (90 animals) 1 ml. of a 4% suspension; and group C (90 animals) 1 ml. of a 0·4% suspension. Test animals were kept under observation for 35 days. In group A 13 deaths occurred between the 2nd and 4th post-inoculation days (maximum mortality 10 deaths on the 3rd day) and 69 between the 9th and 20 days (maximum mortality 28 deaths on the 10th day). In groups B and C there were no deaths during the first 8 post-inoculation days, but in group B 22 deaths occurred between the 9th and 32nd days and in group C 2 between the 24th and 30th days. Because of the short interval between infection and death and the absence of typical symptoms in the affected animals, deaths within the first 5 days in group A could not be attributed to the rabies virus, but, in the authors' view, were due to some toxic agent in the embryonic tissue used for cultivation of the virus. Support was lent to this view by the finding that 40% virus-free chick-embryo suspensions, prepared and treated in the same way as those used for virus cultivation and administered by the same route and in the same dosage as in group A, caused the death of 6 out of 50 guineapigs within the first 6 post-inoculation days. The fact that in groups B and C no deaths occurred within the first 8 days proved that the toxic agent, of which the exact nature still remains in doubt, could exert its action only when in high concentration. The 93 deaths, which in groups A, B and C occurred from the 9th day onwards, were due to the action of the Flury virus; affected animals had invariably shown signs of paralytic rabies of the ascending type and had died after 1–5 days of illness. That there is a direct relation between the amount of virus inoculated and the percentage of mortality occasioned by the virus seems clear from the mortality figures obtained in the 3 groups.

For demonstration of the virus, brain material from a number of dead animals was submitted to the intracerebral mouse inoculation test. Results of inoculations from guineapigs dying in group A within the first 4 days were uniformly negative, and even those from animals dying at a later stage in groups A, B and C, with typical signs of Flury virus rabies, showed the virus to be present in only some 50% of the total examined. The frequent failure to isolate the virus, even in the brains of animals dying after an intracerebral injection of Flury virus, has been reported by KOPROWSKI and COX [this *Bulletin,* 1949, v. 46, 1140], who ascribed the failure to the phenomenon of self-sterilizing neuro-infections, the provocation of which has been shown to be the property of certain strains of rabies virus.

In their second series of experiments the authors studied the protective effect of a phenolized Fermi-type vaccine on guineapigs against intramuscular challenge with Flury virus. In one experiment 60 guineapigs were given 20

subcutaneous injections of vaccine administered on 20 consecutive days and were challenged 10 days after the last injection with 1 ml. of a 40% suspension of Flury virus. One half of the animals had received 1 ml. of vaccine daily and the other half 3 ml. daily. Results during the 35-day observation period showed that, whereas 16 of the animals died within the first 5 days after challenge, only 9 died of typical paralytic rabies between the 6th and 14th days. Comparison of these results with those obtained in group A of the first series provides evidence that a considerable degree of protection was achieved by pre-exposure vaccination. In a second experiment, in which vaccination was not commenced until after virus inoculation, 10 guineapigs were given 1 ml. of a 40% virus suspension and later on the same day the first of the 1 ml. doses of vaccine to be administered daily. Results showed the complete inability of the vaccine to prevent the onset of rabies, the vaccinated animals dying in the same proportion as the control unvaccinated guineapigs and after periods of incubation shorter than in the control group. *G. Stuart*

BOLIN, V. S. **Survival of a Guinea Pig following Infection with Street Rabies Virus—a Case Report.** *J. Amer. Vet. Med. Ass.* 1959, Jan. 15, v. 134, No. 2, 90–92, 1 fig.

" Of 40 guinea pigs inoculated with street rabies virus, 37 died and 3 survived. One of the 3 developed paralytic rabies which did not prove to be fatal. Specific serum neutralizing antibodies against street rabies virus were demonstrated in its serum three months after infection."

SCHNEIDER, M. D., OKANO, M. & FURUSHO, Y. **The Submaxillary Gland in naturally acquired Carnivoral Rabies.** *U.S. Armed Forces Med. J.* 1958, Dec., v. 9, No. 12, 1768–78, 3 figs. [22 refs.]

" Concentration of determinant of infection of submaxillary glands of dogs with naturally acquired rabies disease has been accomplished. A chemically inert, naturally-occurring, siliceous material, endowed with a sorptive characteristic was used in the separation of nonspecific nitrogen component from mechanically disrupted submaxillary glands. Subsequently, high-speed centrifugation of submaxillary gland suspension yielded a pellet of gelatinous substance. The latter material, termed sedimentable fraction, when derived from the submaxillary gland infected with rabies virus, retained ability to incite rabies disease experimentally ; in addition, the fraction contained a corpuscular element reactive in antirabies serum not previously associated with naturally acquired rabies in dogs.

" The background of present knowledge of the nature and properties of rabies virus has been discussed. Fundamental studies of nerve cells of animals infected with rabies have yielded much of known basic facts. Attention has been focused on the fact that mandibular salivary glands of rabid dogs may contain tenfold to a hundredfold more infective rabies $LD_{50}$ for mice than an equivalent unit of fresh weight brain tissue. Yet, it is remarkable that corresponding fundamental knowledge of the relation of the host's salivary gland cells and rabies virus has been virtually neglected. This report raises the

question of whether the site of the submaxillary salivary gland of naturally rabid dogs possesses potential for comprehensive, fundamental, and practical studies of rabies."

SETHNA, Y. I. & SOMAN, D. W. **On the Value of Complement-Fixation Test in the Diagnosis of Rabies.** *Indian J. Pub. Health.* 1958, Oct., v. 2, No. 4, 258–64. [14 refs.]

The methods commonly in use for the diagnosis of rabies in suspected animals have certain limitations: histological examination of brain smears or sections fails to reveal the presence of Negri bodies in 10–15% of known positive brain specimens, while biological tests—the intracerebral inoculation of brain or salivary gland material into white mice for isolation of the virus—ordinarily require about some 10 days or more before diagnosis can be definitely established. With a view to securing both accuracy and speed of diagnosis various workers since 1907 had made trial of the complement-fixation test, mostly, however, with equivocal results. It was not until 1953, when ANDO *et al.* [this *Bulletin,* 1954, v. 51, 686, 1058] claimed to have successfully developed the test, that its specificity in diagnosis appeared to have been demonstrated. The present article records the results of complement-fixation tests carried out on 101 brains and 49 salivary glands; compares the results of these tests with those obtained from brain smear examination and mouse inoculation; and considers the several factors which influence the sensitivity and specificity of the test.

In the complement-fixation tests brain or salivary gland suspension was used as an unknown antigen against a known hyperimmune anti-rabies serum. The method of preparing antigen was that recommended by Ando *et al.* [*loc. cit.*]. A 40% suspension of infected brain material was prepared in buffer-saline, then heated in a water-bath at 40°C. for 1 hour and centrifuged at 10,000 r.p.m. for 15 minutes; the supernatant was used as antigen and for use in the test was diluted to 20% with normal physiological saline solution. In the case of salivary glands a 33% suspension was prepared in buffer-saline and then treated in the same manner as the brain suspension; for use in the test the antigen was diluted with an equal volume of saline.

Of 101 brain specimens subjected to complement-fixation tests, to smear examinations (in all but 5, in which putrefaction had rendered such examination impracticable) and, in the case of Negri-negative smears and the 5 putrefied specimens, to mouse inoculation for isolation of the virus, the results in 97 (96%) were in complete agreement. Of the 4 cases in which the results of complement-fixation tests were in disagreement with those of mouse inoculation, 2 were in specimens possessing a low virus content and 2 in putrefied specimens. In an endeavour to explain the discrepancies noted in brains with low virus titre, the authors studied the development of virus infectivity and complement-fixing antigens in white rats after intramuscular inoculation of street virus. Results showed that a stage of infection may exist in which virus infectivity may be present but complement-fixing antigens have not developed. Active multiplication of the virus would appear to be indispensable for the development of such antigens. In cases of low virus content, therefore, diagnosis must rest on mouse inoculation. The 2 discrepancies in putrefied specimens suggest the unsuitability of such material for diagnosis by the complement-fixation test—

a view opposed to that of ANDO *et al.* (*loc. cit.*), who believe that brains become more antigenic on putrefaction, probably owing to the release of virus from lysed cells.

The results of studies on the distribution of complement-fixing antigen in different parts of the brain, on the suitability of different concentrations of brain suspensions for use in the test and on the effect of heat on the preparation of antigen are also given in that part of the article devoted to the diagnosis of brain specimens. These results suggest: that the parts of the brain to be used for antigen preparation should include the Ammon's horn, cerebellum and medulla oblongata; that, as a practical measure, both 40% and 20% brain suspensions should be used as antigen in the test, especially when the suspension is prepared from cerebral cortex alone; and that, in order to maintain a uniform technique for the test, suspensions (of brain and salivary gland alike) should be heated at 37°C. for 1 hour.

Finally as regards the 49 salivary gland specimens tested in parallel by mouse inoculation and by the complement-fixation test: of the 49 tested 29 were negative by both methods of testing, 20 were positive by mouse inoculation and 15 by the complement-fixation test; 89% of the results were thus in agreement. The results obtained by testing salivary glands by the complement-fixation test do not appear, therefore, to be as encouraging as those obtained with brain material. It may be, as suggested by ANDO *et al.* [*loc. cit.*], that the presence of mucin in the salivary glands inhibits the complement-fixation reaction.

According to the authors "The complement-fixation test has been shown to have a definite place in the rapid diagnosis of rabies in animals, the results being obtained within 24 hours, especially on Negri-negative specimens. The last word, however, could only be obtained by virus isolation which would require at least 8–12 days, a period of anxiety and suspense for the bitten person." As to the specificity of the test, it is noteworthy that not a single case of non-specific positive reaction was observed throughout the work.

*G. Stuart*

SOLOV'EV, V. D., SELIMOV, M. A. & KOBRINSKII, G. D. **The Local Application of Antirabies Gamma-Globulin for Rabies Prophylaxis.** *Problems of Virology*. London. 1958, v. 3, No. 2, 122–4. [Translated from Russian.]

This paper gives the results of 3 series of experiments, in which anti-rabies gamma globulin in powder form was used for the local treatment of wounds infected with street rabies virus.

In these series an area of 1·0–1·50 cm.$^2$ of the masseter muscles of guineapigs weighing 250–300 gm. was exposed on both sides of the head and 12 incisions 3 mm. deep were made on each side; 0·5 ml. of a 10% suspension of street virus from the brain of a dog or a rabbit was introduced into the wound; and the surface of each wound was then dusted with 0·2 gm. of anti-rabies gamma globulin. The animals were kept under observation for 45 days and, in those which died, diagnosis of rabies was confirmed by histological and virological examination.

In series I, in which gamma globulin was applied 5 minutes after infection, 6 of the 10 treated animals and all 10 control animals died of rabies, the average incubation periods being 29 days for the former and 14 days for the latter. In series II the efficacy of gamma globulin was determined in relation to the time-interval at which it was given after infection. Results showed that

gamma globulin, when given within 15 minutes of infection, prevented the development of rabies in 24 of the 30 animals tested, but, when given after longer periods—30 minutes, 1 hour and 2 hours after infection—it gave progressively less protection. In the 6 guineapigs which were treated within 15 minutes of infection, but yet developed rabies, the incubation period was invariably longer than in the control animals. In series III the authors compared the action of the following 4 preparations when used to treat the wound 15 minutes after infection: (1) anti-rabies gamma globulin; (2) anti-rabies gamma globulin mixed with penicillin and streptomycin; (3) concentrated phenol; and (4) anti-tetanus gamma globulin. Results showed that among the guineapigs treated, the onset of rabies was prevented by preparation (1) in 5 out of 8 test animals, by preparation (2) in 4 out of 8, by preparation (3) in 2 out of 7 and by preparation (4) in none out of 8. These results confirm the specific nature of the action of anti-rabies gamma globulin.

On the basis of their experience of the production and introduction into practical use of anti-rabies gamma globulin, the authors suggest that "the best method for its local application must be sprinkling the preparation into the wound in the form of a powder containing the specific antibodies and the antiseptics or antibiotics used in surgical practice". *G. Stuart*

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## PLAGUE

*In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.*

KOROBKOVA, E. I. **Concerning the Methods of increasing the Immunogenic Properties of Various Strains of Plague Vaccines and their Stabilization.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, Nos. 7/8, 985–9. [Translated from Russian.]

The immunogenic properties of the EB strain of *Pasteurella pestis* were enhanced by intraperitoneal passage in guineapigs, a procedure which caused no detectable increase in virulence by the subcutaneous route (guineapigs receiving $15 \times 10^9$ organisms subcutaneously all survived). Only 1 out of 10 guineapigs inoculated with 10,000 living organisms from the unpassaged EB strain survived challenge 25 days later with 1,000 lethal doses of a virulent strain, while 9 out of 10 guineapigs which had received an equal dose of a culture from the 9th passage of the EB strain survived this challenge.

The stability of the passaged strain was found to be most effectively preserved in organisms contained in dried preparations of the spleens of guineapigs infected by intraperitoneal inoculation. *R. S. F. Hennessey*

WEGNER, Zofia & PRZYBOROWSKI, T. **Ectoparasites of Rats in the Port of Gdynia.** *Bull. Inst. Marine Med. Gdańsk.* 1958, v. 9, Nos. 3/4, 167–79, 1 map and 2 graphs. [43 refs.]

During the period March 1956 to March 1957 the authors studied the ectoparasites of rats trapped at five different points in the port of Gdynia, Poland.

Altogether 321 specimens of *Rattus norvegicus* and 55 of *R. rattus* were trapped and a total of 1,727 ectoparasites recovered. The five trapping sites were selected on the basis of providing representative environmental types ranging from primitive store buildings and livestock quarters to brick-built houses with cellars and wooden out-houses.

It was found that about 72% of *R. norvegicus* were infested, and 78% of *R. rattus,* the numbers of parasites ranging from 0 to 156 per animal. Lice predominated in both species of rat, the figures for *R. rattus* and *R. norvegicus* being, respectively, 79% and 85·7% ; for fleas the figures were 13·8% and 10·4%, and for acarines 7·2% and 3·9%.

Separate seasonal peaks in the lice and flea populations were found, lice being maximal in June while fleas reached their peak in October when lice were at a low level. Only one species of louse was found, *Polyplax spinulosa,* while fleas were almost exclusively *Ceratophyllus fasciatus,* only one specimen each of *Xenopsylla cheopis* and *Ctenophthalmus agyrtes* being found. 10 species of acarine were found, the most numerous being *Tyrophagus* sp. Some differences were found between the ectoparasites of rats from the different trapping areas.

The epidemiological importance of the various arthropods found is stressed with respect to the transmission of plague and tularaemia. *E. R. Nye*

Kartman, L., Prince, F. M., Quan, S. F. & Stark, H. E. **New Knowledge on the Ecology of Sylvatic Plague.** Reprinted from *Ann. New York Acad. Sci.* 1958, June 3, v. 70, Art. 3, 668–711, 6 figs. [Numerous refs.]

This is a review of work on silvatic plague, mostly carried out by the authors and their co-workers, some of which has already been abstracted in this *Bulletin* [see, for example, this *Bulletin,* 1958, v. 55, 503, 763, 1223 ; 1959, v. 56, 42]. The authors consider that the emphasis, in the International Sanitary Regulations, on urban and ship-borne plague is in need of revision, in view of the possibility of the transfer of plague from small rodents and the possibility of rapid transport of human infections abroad. An expanding human population is also likely to come into contact with foci of sylvatic plague under sub-urban conditions.

In the San Francisco Bay area of the United States, the vole, *Microtus californicus,* is believed to be the principal reservoir of plague and is very resistant to infections with *Pasteurella pestis.* This species was parasitized by 90% of the total fleas found on rodents and, of these, *Hystrichopsylla linsdalei* and *Malaraeus telchinum* were found to have relatively high natural infections during epizootics. *Hystrichopsylla* is an efficient vector by blocked individuals, and *Malaraeus* is an abundant flea which is able to transmit mechanically. Plague infection rates in fleas taken in the field could be determined by crushing and streaking fleas on blood agar plates. This method was found by experiment to compare favourably with the established method of inoculating flea pools into mice [*ibid.,* 1959, v. 56, 42]. By tagging fleas with radio-active cerium [*ibid.,* 1957, v. 54, 759], *Malaraeus* has been shown to transfer from voles, in experimental plots, to domestic rats (*Rattus norvegicus*). *B. R. Laurence*

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## AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

*In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.*

De Carneri, I. Distinzione dei ceppi stabilmente apatogeni di *E. histolytica* da quelli patogeni in fase avirulenta. [**Differentiation of Stable Non-Pathogenic Strains of** *E. histolytica* **from Pathogenic Strains in the Avirulent Phase**] *Riv. di Parassit.* Rome. 1958, July, v. 19, No. 3, 175–81. [28 refs.] English summary.

The author discusses the criteria for distinguishing strains of *Entamoeba histolytica* which are permanently non-pathogenic from pathogenic strains whose virulence has been attenuated. The recognition of these strains is important from the point of view of the policy to be adopted in the drug treatment of symptomless carriers, who may be infected with strains of either type. In this connexion more information is required regarding the geographical distribution of the pathogenic and non-pathogenic strains.

In order to attain this object, the following procedure is recommended: (1) Stool specimens containing cysts or trophozoites of the large race of *E. histolytica* should be sent to specialized laboratories for examination. (2) This material is inoculated into at least 10 young rats: strains producing a high degree of infection and ulceration are regarded as being pathogenic and in the virulent phase. (3) All strains which appear to be non-virulent are passaged through the livers of 5–10 hamsters, together with the bacterial flora isolated from a virulent strain of *E. histolytica.* (4) Amoebae recovered from the liver are then cultivated and inoculated intracaecally into 10 rats: in the case of attenuated strains, this procedure will restore their virulence and reveal their pathogenicity, whereas strains which prove to be non-invasive to rats can be regarded as permanently non-pathogenic. *C. A. Hoare*

De Blasi, R. & Magaudda-Borzì, L. La sierologia dell'amebiasi. [**The Serology of Amoebiasis**] *Riv. di Parassit.* Rome. 1958, Oct., v. 19, No. 4, 267–96. [Numerous refs.]

A critical review and discussion.

Wright, F. J. **Amoebiasis in Britain.** *Practitioner.* 1958, Dec., v. 181, No. 1086, 739–42.

The title of this paper would appear to be rather misleading. It does not concern amoebiasis contracted in Britain, but 5 examples of the disease contracted abroad. There are details of 5 cases of amoebic dysentery and its complications in patients in the United Kingdom—in 4 long after their return from the tropics.

The first patient had active intestinal amoebiasis 12 years after leaving the tropics, and 11 and 14 years, respectively, after two attacks of amoebic hepatitis. The second patient had acute hepatic amoebiasis 9 years after presumed infection in India or Burma. The third patient had a recurrence of acute amoebic

hepatitis 10 years after leaving the tropics. The fourth had an amoebic abscess rupturing into the pleural cavity 9 years after leaving India and Burma, without any history of diarrhoea. The fifth had a pyogenic abscess of the liver (without early localizing signs), after one year's residence in Ghana, in the absence of early localizing signs of diarrhoea. *Philip Manson-Bahr*

BIAGI F., F. Algunas observaciones clínicas sobre 46 casos de amibiasis en niños. [**Clinical Observations on 46 Children with Amoebiasis**] Reprinted from *Bol. Med. Hosp. Infantil.* Mexico. 1958, v. 15, No. 5, 633–6.

The English summary appended to the paper is as follows:—

"A study was made of 46 cases of children with amebiasis which was diagnosed by demonstration of the parasite.

"Seventeen per-cent did not present manifestations that could be attributed to *E. histolytica*; these children were older than those that did present intestinal and hepatic manifestations.

"A great majority presented bloody diarrhea; fever and hepatomegaly were frequent findings. In 13 cases that presented hepatic manifestations, 12 presented diarrhea, also; only 4 cases of amebic abscess were demonstrated."

DE CARNERI, I. Studi su *Entamoeba moshkovskii.* II. *Entamoeba moshkovskii* Tshalaia, 1941, come potenziale parassita: sua sopravvivenza nelle infezioni sperimentali intraepatiche dell'hamster e endociecali del ratto albino. [**Studies on** *Entamoeba moshkovskii.* **II.** *E. moshkovskii* **as a Potential Parasite: its survival in Experimental Infections of Hamster's Liver and Rat's Caecum**] *Riv. di Parassit.* Rome. 1958, July, v. 19, No. 3, 161–8. [14 refs.] English summary.

In view of (1) the morphological similarity of *Entamoeba moshkovskii* to the parasitic entamoebae of man, reptiles and amphibia, (2) its growth in culture at different temperatures, and (3) its susceptibility to amoebicidal drugs, experiments were carried out to determine whether it represents a free-living phase of some parasitic species. Since the virulence of attenuated strains of *E. histolytica* for rats can be restored by passages through hamster liver, this method was also used in the present study.

Cultures of a Brazilian strain of *E. moshkovskii* grown at 26°C. were inoculated into the livers of about 30 hamsters, together with antibiotics for the control of associated bacteria. The resulting small hepatic lesions were attributed to bacterial infection. The presence of amoebae in the lesions was tested by cultures in which growth was obtained only from 50% of the animals 2 days after inoculation, whereas all cultures made on the 5th day were negative.

Attempts to transfer the amoebae by serial liver passages through hamsters were likewise unsuccessful. In another experiment, the amoebae were passaged for 81 days through the livers of 8 hamsters alternating with cultures at 37°C., after which the amoebic cultures were inoculated intracaecally into 35 young rats. A parallel series of 35 rats were similarly inoculated with cultures kept at 26°C. The infection failed to establish itself in either group, the maximum survival of the amoebae being 3 days, in the case of cultures grown at 37°C.

It is concluded that *E. moshkovskii* is unable to adapt itself to parasitism in rats or hamsters even under the most favourable conditions.

[For Part I of this series, see this *Bulletin,* 1958, v. 55, 1330.] *C. A. Hoare*

De Carneri, I. **The Frequency of Balantidiasis in Milan Pigs.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1958, Sept., v. 52, No. 5, 475–6.

In their account of a case of balantidial infection in Northern Ireland Kennedy and Stewart [this *Bulletin,* 1958, v. 55, 274] summarized the frequency of the infection in healthy pigs in six countries, but did not include data for Italy. The present author suggests that the varying incidences recorded depend more on the test method used than on geographical distribution. Direct examination will not easily reveal balantidia in the caecum if they are scanty. In such cases, he uses a method similar to the common technique for concentration of nematode larvae in faeces, which is carried out as follows.

Within 2 hours of slaughter of the animals, 50 to 100 gm. of faeces from the caecum are placed in a bag made of one or two layers of gauze, which is suspended in 1-litre conical flasks of the kind used for urine sedimentation. The bags are filled with M/15 phosphate buffer, *p*H 7·2 at 37°C. The motile balantidia move rapidly out of the gauze and are concentrated at the bottom of the flask. After 30 to 60 minutes, sediment from the flask is examined microscopically at × 25 magnification and, for confirmation, at × 125. If the results are negative, examination is repeated in 3 to 6 hours, if necessary with squeezing of the bags.

The number of balantidia tends to decrease with time and initially positive specimens may be negative after 24 hours. Methods based on enrichment in culture media gave inconstant results.

On 7 different occasions in June and July 1958 the author examined 80 pigs slaughtered in Milan abattoir. Only one animal was free from *Balantidium* in the caecum. *H. J. O'D. Burke-Gaffney*

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## LEPROSY

*In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.*

Cochrane, R. G. **Leprosy in Theory and Practice.**

This book was reviewed on p. 496.

Leprosy Review. 1959, Jan., v. 30, No. 1, 7–60. **Report of the Proceedings of VII International Congress of Leprology, Tokyo, Japan, 12–19 Nov., 1958.**

The Editor of *Leprosy Review* is to be congratulated on having produced in record time a comprehensive abstract of the papers, discussions and resolutions

of the VII International Congress of Leprology. Too often reports are delayed until interest has begun to wane; but this excellent abstract, appearing as it does within 2 months of the date of the Congress, will whet the appetite of readers for the fuller report to appear later.

Profiting by experience of the three previous congresses, the International Leprosy Association, which was responsible for the scientific side, organized some 18 months beforehand 6 panels, one on each of 6 aspects of leprosy: bacteriology and pathology, therapy, classification, epidemiology and control, immunology, and social aspects. Each panel consisted of a chairman and 3 or 4 other members, chosen for their previous work and to be as representative as possible of different countries and viewpoints. Panel members were invited to send contributions to their chairman whose duty it was to coordinate these contributions, basing his findings on those of the previous congress held at Madrid in 1953. At the Congress these contributions and findings were given the leading place, being heard and discussed before the proffered papers were heard. In the light of contributions and discussions at full sessions, technical committees of members, generally the panels with a few members added, dealt further with their respective themes and prepared resolutions for submission to full congress for approval or rejection. There was a fair degree of unanimity in all themes except that of classification. There was a feeling that until leprologists from various countries and with varying views can get together leisurely with microscopes and cases it may be impracticable to reach a world-wide acceptable classification. It is impossible to abstract further what is already reduced to tablet form in this Report, but a few "highlights" may be mentioned. Progress has always been most hampered by inability to inoculate laboratory animals successfully. Two papers were read giving at least promising results of success in this direction. These were by D. H. Binford with golden hamsters, and K. R. Chatterjee in a special strain of hybrid mice.

Several papers were read on the new drug Ciba 1906 (DPT) which is proving useful when for any reason DDS is not well tolerated. Much interest was shown in the bacillary index charts shown by T. F. Davey which to a large extent simplify the supply of controls in testing new drugs. Particular interest centred round a paper by E. Del Pianto on thioethyl compounds (ET) declared to be "safe and quicker than DDS".

[For a bird's-eye view of what is happening throughout the world regarding leprosy research the 53 pages of this Report are strongly commended.]

*Ernest Muir*

Leprosy in India. 1958, Jan., v. 30, No. 1, 1–117. **Sixth All-India Leprosy Workers' Conference and the Third Biennial Meeting of the Indian Association of Leprologists, Gorakhpur, Dec., 1957.**

These two gatherings were held from December 13 to 16, 1957 at Gorakhpur near the borders of Nepal and in the vicinity of the birthplace of the founder of Buddhism. These two bodies meet every second year, the more scientific leprologists' society coming together for the 2 days preceding the larger and more general conference which was attended this year by 172 delegates.

At the first session (p. 9) there were papers and an interesting discussion on the role of chemotherapy in the control of leprosy. Conditions in India were compared with those in Nigeria where sulphone therapy appears to have had

an important effect in diminishing the disease. The treatment of patients at clinics was considered, but though this was important isolation should also be maintained as much as possible in the open infectious cases. A chief difficulty was that only about 70% of patients were willing to attend for treatment, and though patients attended well to begin with they tended to become irregular in attendance after the first 2 years. The difference in the social aspects between West Africa and India could explain the disparity of results in the two countries.

At the second session (p. 13) a paper was read and discussed on the morphology of lepra bacilli as seen in electron micrographs. An attempt was made to show by cytochemical study the structure of the bacilli, their condition (whether living or dead), and their position in the tissues especially in relation to the nerve fibres and nerve endings.

At the third session (p. 15) there was special stress on the control of lepra reaction, whether this was a sign of good progress or not. In this connexion the dosage of sulphones was considered and the combination of sulphones with thiosemicarbazone and isoniazid. Various conditions influence the onset of reaction such as the season of the year and various complicating infections.

A paper on reconstructive surgery (p. 21) first described the aetiology of bone lesions in leprosy, and showed the method of correcting drop foot by transposition of the tibialis posterior. In uncomplicated paralysis of the hand the original operation has been abandoned as it was apt to overact and cause the opposite deformity. "The present operation is a free graft making use of the extensor carpi radialis brevis. . . . Plastic surgery offers a wide field in the treatment of deformities of the face in leprosy." There are now 4 centres in India where reconstructive surgery in leprosy is practised, and there will soon be more.

A useful paper (pp. 23 and 89) was read on eye lesions in leprosy and their management. In non-lepromatous leprosy the most important ocular complication is lagophthalmos (so called from the Greek word for a hare, which was once supposed to sleep with its eyes open). In lepromatous leprosy the chief trouble is keratitis, which is either punctate (superficial) or interstitial (deep). It is important to watch for the earliest signs of these and put the eye to rest with atropine (1%) twice daily, and dark glasses. Cortisone is contra-indicated if there is any superficial ulceration. For intra-ocular operations it is well to wait till all active signs of infection have been healed by chemotherapy, except in secondary glaucoma. In the much commoner low ocular pressure an intra-ocular operation may be the "last straw" and cause destruction of the eye, whereas with medical treatment the eye as a rule gradually returns to normal. In extraction of cataract, if there are any signs of previous iritis it is well to do an iridectomy first and allow any inflammatory reaction due to residual infection to subside, before extracting the lens at a subsequent date.

Under leprosy control (pp. 58 and 94) two different schemes were described. The former has been undertaken in collaboration between the Government of India and the State Governments. During a period of 2½ years 56 centres have been started, in 4 of which there are arrangements for special study of leprosy. The total population of the project areas is 4,300,000, of which 3,000,000 have already been included in the surveys. "The total number of known cases (by survey and otherwise) in the project areas is 44 thousand. 38 thousand or 86% of the known cases have so far been registered for treatment. Of these 38

thousand registered cases, 25 thousand are Non-lepromatous, and 13 thousand or 34% are Lepromatous." 73% of the registered patients are having regular treatment.

The other control scheme is under the Gandhi Memorial Leprosy Foundation (p. 97). The method used by this Foundation has already been described [this *Bulletin,* 1957, v. 54, 47]. At the end of 1956 there were 10 control units, but one has since then had to be closed down as the patients were not cooperative. The present 9 units cover a population of 192,835, of which 91% have been surveyed, and 512 lepromatous and 3,181 non-lepromatous subjects have been detected. This gives an average incidence of 18·1 per thousand. The personnel needed for this work is of two kinds: doctors and lay workers.

There are several difficulties in getting doctors: the laborious nature of the work, its monotony after the first few months, the doctor is out of touch with general medicine, there is difficulty in getting suitable quarters and in arranging for the education of children. In spite of all this the Foundation has found a certain number of doctors, but another difficulty is the various dialects and languages spoken in India. At this time in India much progress is being made in many other public health fields, and there is a scarcity of doctors, who prefer other spheres of work where the conditions and rates of remuneration are more favourable. On account of all this " our whole control work has, therefore, to be so modified that we make use of all the [non-specialist] doctors in doing a part of leprosy work and use full time medical men [specialist] only for special jobs like organisation, supervision and research or only in special circumstances for routine leprosy work ".

A third Relief and Control Scheme (p. 103) is reported from the Madurai District in which the characteristic is that treatment is taken once a week to the doors of the patients in certain instances, and in any case patients have not to walk more than 5 miles for treatment. There are 13 centres where 1,102 patients are under treatment in one " block " of villages, 1,939 in a second block, and 1,030 in a third. The staff consists of a leprosy specialist and, as proposed in a modified scheme, 9 teams, each consisting of a trained prevention officer and a nursing orderly.

There are two instructive papers (pp. 107 and 109) on the social aspects of leprosy and methods of rehabilitation of recovered patients.

A paper deals with customs, acts and rules affecting patients, and suggests modification of the rules regarding marriage, travelling in trains, and so on.

[This whole number is of particular value and interest. It contains a wealth of experience and careful thought contributed by specialists in the various aspects of leprosy, who have made this difficult subject their life work.]

*Ernest Muir*

INDIAN J. DERMAT. 1958, Oct., v. 4, No. 1, 1–70, numerous figs. [Numerous refs.] **Special Leprosy Number.**

In an editorial it is emphasized that leprosy is one of the most important skin diseases in India. " Here in Calcutta, we come across 1 or 2 cases amongst every 10 skin cases that come for consultation." Hence the need for a special leprosy number of this journal, to which there are no fewer than 22 contributors, each dealing with a different aspect of the subject. After chapters on aetiology and pathology there are 4 articles on the clinical and diagnostic features, followed by 2 on treatment. In the next 5 chapters lepra

reaction, eye conditions, and the symptoms and treatment of neural involvement are described adequately. Polyneuritic lesions are dealt with in 2 chapters on trophic ulcers and reconstructive surgery. An article on urinary complications of DDS treatment illustrates this point with details of 5 cases and concludes that "sometimes urinary infections can be precipitated by DADPS therapy", making it necessary to suspend this treatment for a time. The next 3 chapters are devoted to control, out-patient clinics and social aspects. An interesting account is given of 2 patients who acquired slight clinical leprosy lesions after insect bites. The last article recommends the use of injections of hyaluronidase into the lesions in thickened nerves in tuberculoid leprosy.

While there is not much that is new in this special number, it includes within small space a series of articles covering the whole subject of leprosy and written by specialists with long experience of the disease and particularly of the aspects on which they write. *Ernest Muir*

FONDS REINE ÉLISABETH POUR L'ASSISTANCE MÉDICALE AUX INDIGÈNES (FOREAMI). Sect. Père Damien. [**The Queen Elisabeth Fund for Medical Assistance to the Indigenous Population (FOREAMI). Symposium on the Histopathology of Leprosy**] *Bull. d'Information sur la Lèpre No. 6.* 1958, 87 pp., 5 graphs (1 coloured), 1 diagram & 6 figs. [10 refs.] Colloque d'Histopathologie de la Lèpre, Léopoldville, 17–19 Apr. 1958 [DUBOIS, A., President].

In an opening note (p. 12) Professor A. DUBOIS mentions that in 1939 known leprosy patients in the Belgian Congo numbered 60,000; while in 1957 they were estimated at 300,000. He asks whether with the therapeutic progress and social amelioration now available it will not be possible in the next 15 to 20 years to reduce leprosy from a major to a residual problem.

The same author (p. 17) writes on the principal types and groups of leprosy and the histopathological and clinical characteristics in classification. The frank case of lepromatous leprosy is pathognomic, but early diagnosis is all-important and in the early stages this type is not easy to recognize by its histological appearance. The author prefers in such cases to rely more on the clinical signs, the finding of bacilli and changes in the nerves.

He agrees with BAUDIMENT and LAVIRON that histodiagnosis is a useful complement in diagnosing a specific leprous lesion, but that by itself it should not be relied upon either in diagnosing or in classifying leprosy.

S. G. BROWN (p. 25) writes on the histopathology of the lepromatous type of leprosy and its evolution under the effect of treatment. He first describes the histopathological appearances of the skin in its different layers in lepromatous patients and at different stages of advancement of the disease. He describes the changes which take place in the bacilli during treatment as regards their position in and between the cells and in their appearance. After a certain period of treatment there may be new growth of blood vessels in the superficial layer of the skin and an increase in the number of bacilli. This recrudescence does not, however, imply that the final result of treatment will be any less favourable. There may be very little difference in appearance histologically between a new advancing lesion and one that is retracting under treatment. Sometimes residual cellular reactions may closely resemble dimorphous or even tuberculoid

lesions. In estimating the results of treatment it is important to take into consideration the histological, bacteriological and clinical findings.

M. LECHAT (p. 36) writes on the diagnosis of leprous macules with special reference to tuberculoid and borderline lesions. He examines in order the clinical, bacteriological, immunological and histopathological values in classifying cases of leprosy. He asks the question: is it necessary to take biopsies of the 250,000 non-lepromatous cases of leprosy in the Belgian Congo ? If one wishes to classify them, the answer is " yes "; if one wishes to treat them and heal them, the answer is " no ". What is important is that patients should be divided into those who are contagious and those who are not, so that the latter may have treatment at home. A table is given which shows how 33 clinically diagnosed lepromatous cases were classified histologically: 12 as lepromatous, 8 as tuberculoid, 7 as undifferentiated, and 6 as dimorphous. He considers that there are 4 indications for biopsies: (1) when there are atypical bacteriologically negative macules, so as to exclude patients who are not suffering from leprosy and thus spare them from needless treatment; (2) in patients suspected of having a tuberculoid reactional form which might evolve into a borderline form, so that they may benefit from combined sulphone and hormone treatment; (3) to enable leprologists to check up their clinical diagnosis at leprosy clinics; (4) to help make a prognosis in patients who are waiting till they have recovered before marrying or entering on any other important undertaking.

The author ends with a reference to the large proportion of Central Africans who suffer from the tuberculoid type of leprosy, 80% of all cases being a common figure in the Belgian Congo. A similarly high proportion has been found among Negroes in French Guiana and Brazil.

J. CAP (p. 61) writing of the classification of leprosy regrets the use of the word " tuberculoid ", because this is a histological term, whereas a clinical diagnosis is generally made, and both early and residual tuberculoid lesions may not have the typical histological structure. He opposes the application of a definite classification of " indeterminate " to an unstable form of lesion, since its future course may to a large extent be determined by bacteriological examination and the Mitsuda reaction. Classification should be based on 4 factors which are, in decreasing order of importance, clinical, bacteriological, immunological and histopathological. However, when the histopathological picture does not correspond with the results of the other 3 examinations the classification should not be modified except in the case of an obvious error, seeing that the evolution of the disease is subject to natural changes or to changes brought about by treatment. *Ernest Muir*

SHUBIN, B. F. **[Leprosy: a Review of its Present Treatment in the Leprosy Institutions of the U.S.S.R. Compendium of Scientific Works on Leprosy]** *Astrakhan.* 1957, v. 2, 3–15. [In Russian.]

The present state-organized system of the Soviet health authorities is compared favourably with the previous system which was dependent on voluntary contributions. [No indication is given of the number of patients suffering from leprosy in the U.S.S.R., but the impression is left that the disease is widespread and on the whole of a severe nature.] In addition to the Rostov Clinical Experimental Leprosarium, the Institute for the Study of Leprosy, and

the Leprology Section of the Central Committee of the Medical Institute, the following leprosaria are mentioned: Abinsk, Ukraine, Tersk, Kazakh, Irkutsk, Turkmen, Tadzhik, Uzbek, Latvia and Baku, as well as the Astrakhan prophylactorium and the Zagor clinic.

Considerable research work is apparently being carried on at and in connexion with the Leprosy Institute. A large number of drugs which have been tested are mentioned, but none of them appears to have given satisfactory results. DDS and sulphetrone [solapsone] were introduced in all leprosy institutions in the U.S.S.R. in the second half of 1951, and the beneficial results in 5 leprosaria and the Leprosy Institute are shown by improvement in 67% in 1953 as compared with 24% in 1950. In the Leprosy Institute alone improvement was noted in 85% in 1953. [No bacteriological results are given.]

Treatment is becoming the basic factor governing success in the battle against leprosy. "At the present time we cannot tolerate the lack of understanding and utterly unjustifiable conservatism which continues to be shown by some medical workers and also by the doctors in charge in certain leprosaria in the problems affecting leprosy treatment. Moreover, the treatment of patients in some of our leprosy institutions is unsatisfactory and requires improvement."

*Ernest Muir*

DAVEY, T. F. & HOGERZEIL, L. M. **Diethyl Dithiol*iso*phthalate in the Treatment of Leprosy. (ETIP or 'Etisul'); a Progress Report.** *Leprosy Review.* 1959, Jan., v. 30, No. 1, 61–72, 2 figs.

Following on the work of DEL PIANTO (*Ric. Sci.*, 1950, v. 20, 83) who found that a mixture of certain thiol compounds prevented the development of tuberculosis in infected guineapigs, the authors decided to test the effects of diethyl dithiol*iso*phthalate (ETIP) in the treatment of leprosy. It is the ester formed from isophthalic acid and ethyl mercaptan. It is a bland pale yellow oily liquid with a disagreeable smell somewhat like garlic. In a first group of 9 lepromatous patients the trial proved self-limiting as the smell in the patients' breath proved offensive to themselves and their neighbours. 3 cc. of a 70% cream was rubbed over a large area of the body once a week, but it lacked a perfume strong enough to cover the smell of the drug. In a second group, with ETIP more agreeably perfumed, and rubbed over only parts of the body uncovered by clothes, the treatment was more acceptable to the 22 volunteer patients. They were given 6 cc. of ETIP twice weekly. With some difficulty patients were persuaded to continue with this preparation for periods up to 5 months. In a third group of 10 lepromatous and 5 non-lepromatous patients 6 cc. was administered twice weekly, rubbed over a wide area of the body.

Reviewing the results the authors noticed 2 interesting facts: when ETIP was associated in some way with DDS the disease took a particularly advantageous course, and patients did particularly well in whom there was a macular element in their clinical picture. It was found that there was a reversal of the usual sequence in the chemotherapy of leprosy, for bacteriological progress preceded clinical progress instead of following it, and patients themselves, although feeling well, did not appreciate from the appearance of their lesions the change that had occurred.

In these trials the standard was the Bacterial Index based on the findings at numerous sites. This was produced as a graph curve and compared with the curve of the average decline in the Bacterial Index of 150 patients who had

been treated during the last 4 years with DDS. This is considered to yield a more reliable standard than can be provided by individual controls.

"The possibility that drug resistance may develop quite quickly if the drug is used alone is itself sufficient to remove ETIP from the select group of basic leprosy remedies, but it already appears to have a place as an adjunct to oral chemotherapy, and if drug resistance can be delayed by combination with other drugs, its future influence in leprosy treatment may be considerable." Psychologically the inunction is advantageous when used to supplement oral treatment, and it also improves the general condition of the skin. A curious finding is the difference in effect produced by ETIP between one patient and another. It has been suggested that its effect may be to stimulate the natural defences, perhaps by inducing a measure of antibacterial activity in the macrophages. No signs of toxicity have yet appeared, and another advantage is that the price is low.

*Ernest Muir*

KELKAR, S. & RANADIVE, K. J. **Biological Factors in Transmission of Human Leprosy to Laboratory Animals. I.** *Indian J. Med. Sci.* 1958, Nov., v. 12, No. 11, 873–83, 6 figs. on pl. [20 refs.] **II.** *Ibid.*, 884–91, 6 figs. on 2 pls.

i. In the first of these papers, experiments are described in which unsuccessful attempts were made to infect rats and mice with *Mycobacterium leprae* from lepromatous leprosy tissue. The bacilli were injected subcutaneously into 1-day-old albino rats, some of the animals being reinoculated on the 30th day and again on the 62nd day; suspensions of bacilli were also injected intramuscularly and intraperitoneally into, respectively, 21-day-old and 22-day-old rats. The new-born rats were killed after 15 days and the other rats after 9 or 18 months, and although the glands showed infiltration by histiocytes, macrophage infiltration and the presence of giant cells, only acid-fast dust was found.

In other experiments, 1 mgm. of cortisone was given daily for 4 days, to young rats which had been infected 30 days previously when 1 day old, and then reinfected on the 35th day and again on the 40th day, 4 days' treatment with cortisone being given after each reinfection. Cortisone, 0·5 mgm., was also given to 21-day-old rats for 7 days after infection, the infection being repeated and cortisone, 1 mgm., given for 7 more days. In other experiments, rats were fed on a diet deficient in vitamin B; in one experiment the rats were infected after 40 days on the diet and reinfected 20 days later, and in a second experiment, in which 21-day-old rats were placed on the diet, 1 mgm. of cortisone was given from the 31st to the 38th day, followed by infection and further cortisone for 5 days and reinfection on the 60th day. Attempts were also made to sensitize mice with lepromin by giving injections of lepromin every 3rd day for a month and then infecting them with the lepromatous tissue. In other experiments, hyaluronidase was injected 15 minutes before the injection of the lepromatous material. These various experimental groups were observed for periods from 12–18 months, and in none was there any significant difference in the tissue reaction to the repeated injections of the lepromatous material and only acid-fast granules were found in the sections.

ii. In the second paper, successful multiplication of the human leprosy bacillus in golden hamsters is claimed. Hamsters of ages ranging from 30 days to 9 months were irradiated with 100–200 r from an X-ray unit and infected

subcutaneously with lepromatous material, or bacillary suspensions; in some of the animals the irradiation was given during a course of 5 daily doses of 3 mgm. of cortisone. These experiments lasted for 6 months and in the animals irradiated and infected at the age of 30 days, acid-fast bacilli were found in the draining lymph glands, the skin and testes. The bacilli were present in large numbers in epithelioid cells, indicating that multiplication of the bacilli had occurred. *S. R. M. Bushby*

KUSAKA, T. **Studies on the Metabolism of Murine Leprosy Bacilli. I. Stimulating Effect of Mitochondria Extract of Rat Liver on the Metabolism of Bacilli.** *Japanese J. Med. Sci. & Biol.* 1958, Aug., v. 11, No. 4, 277–85, 9 figs. **II. Substances, contained in Mitochondria Extract of Rat Liver, which stimulate the Metabolism of Bacilli and some Enzyme Systems in the Bacilli.** *Ibid.*, 287–93, 1 fig.

I. " 1. Heated mitochondria extract of rat liver was found to stimulate the endogenous metabolism of murine leprosy bacilli as well as D-glucose oxidation caused by the bacilli under anaerobic condition, and optimum conditions for these reactions were examined in detail.

" 2. Succinate oxidation of the bacilli was also stimulated by the liver mitochondria extract under aerobic as well as anaerobic conditions.

" 3. These stimulating effects of the liver mitochondria extract were specific neither to the organs nor to the species of animals.

" 4. Murine leprosy bacilli oxidize L-glutamate, L-glycine and palmitate besides D-glucose or succinate under anaerobic condition."

II. " 1. It was found that the endogeneous metabolism of murine leprosy bacilli under anaerobic condition was stimulated by the addition of pyridine coenzymes.

" 2. Succinate oxidation caused by the bacilli seemed to be stimulated by the addition of flavine coenzymes as well as pyridine coenzymes.

" 3. An effective method was found to extract some enzyme systems by the destruction of bacterial cell walls.

" 4. It was found that succinoxidase, G-6-P deHase and aldolase existed in the bacillary extract, though all the enzyme activities were very low."

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## HELMINTHIASIS

*In this section abstracts are arranged as far as possible in the following order:—*TREMATODES *(schistosomes, other flukes);* CESTODES *(Diphyllobothrium, Taenia, Echinococcus, other cestodes);* NEMATODES *(Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.).*

WAGNER, E. D., LEMON, F. R. & BURNETT, H. S. **The Use of Dithiazanine in the Treatment of Helminthiasis in Mexican Farm Labourers.** *Amer. J. Trop. Med. & Hyg.* 1958, Nov., v. 7, No. 6, 600–602.

After quoting earlier literature on the efficacy of dithiazanine [this *Bulletin*, 1958, v. 55, 436, 530 and 919], the authors report the results of treating

Mexican labourers removed from Mexican endemic areas of infection with helminths to California, where there was a low probability of reinfection. They were treated as active out-patients, but this made the follow-up more difficult.

Of the 1,006 labourers examined, 91 had one or more helminthic infections (*Ascaris lumbricoides, Trichuris trichiura, Enterobius vermicularis, Strongyloides stercoralis, Taenia* sp. *Hymenolepis nana*) and of these 64 were adequately followed up after treatment. Stools were examined before and after treatment by the zinc sulphate flotation method, the tests after treatment being done at approximate intervals of 10, 30 and 90 days.

The patients were given orally either 200 mgm. of dithiazanine thrice daily for 4 days (total 2,400 mgm.) or 300 mgm. thrice daily for 3 days (total 2,700 mgm.). Other workers have given 600 mgm. daily for 5 days or more. The average weight of the patients was 137 lb. Urine and blood examinations showed no significant changes up to 1 week after treatment; but 24 of 73 patients treated had nausea or vomiting or both and this coincided with a food-poisoning outbreak in the patients' camp and it was not possible to find out how far the gastric trouble was due to this. One patient, convalescent from hepatitis, could not tolerate the drug, but he was the only one who could not complete the treatment. Another patient tolerated only 100 mgm. thrice daily (total 2,400 mgm.), but this apparently cured his hookworm infection [but see below]. Side-effects seemed to be more frequent and severe on hot days and no complaints came from men not directly exposed to the sun.

The results, given in tables, show the positive and negative findings of worm eggs. All the 5 patients with trichuriasis and the only one with strongyloidiasis were negative for 3 months after treatment. All the 22 patients with ascariasis and all the 3 with enterobiasis were also negative. Of the 16 patients with hookworm, only 3 remained negative for the 55, 69 and 78 days during which they were followed up; this agrees with the findings of others on the effect of this drug on hookworm. 10 of the 23 patients infected with *Hymenolepis nana* and all the 6 patients infected with *Taenia* sp. were negative during the variable follow-up periods after treatment.

The treatment of tapeworm infections with dithiazanine has not been previously reported. *G. Lapage*

ALMICI, C. & BONETTI, F. L'ossigeno nel trattamento delle elmintiasi. **[Oxygen in the Treatment of Helminthiasis]** *Arch. Ital. Sci. Med. Trop. e Parassit.* 1958, Oct., v. 39, No. 10, 627–32.

The English summary appended to the paper is as follows:—

"27 cases of helminthiasis were treated by oxygen given into the duodenum according to Kravetz's technique. Out of the 27 individuals treated, in 21 (10 infested by Taenia saginata, 2 by Taenia saginata and Tricocephalus dispar, 7 by Ascaris lumbricoides, and 2 by Anguillula intestinalis) the infestation was completely eradicated, while in the other 6 (3 infested by Taenia saginata, 2 by Taenia saginata and Tricocephalus dispar and 1 by Oxyuris vermicularis) the results were negative.

"The patients were systematically followed up for about three months by routine coprologic examinations for the evaluation of the treatment efficiency."

ZAKARIA, Hanna. **Historical Study of *Schistosoma haematobium* and its Intermediate Host, *Bulinus truncatus,* in Central Iraq.** *J. Faculty of Med., Baghdad.* 1959, Jan., v. 1 (n.s.), No. 1, 2–10, 1 map & 4 figs. on 2 pls.

" 1. Only the earliest records of Urinary Schistosomiasis and of the intermediate host have been reviewed.
" 2. Sub-fossil shells of *Bulinus,* the intermediate host of *Schistosoma haematobium,* have been discovered by the author at a number of historical sites in Iraq.
" 3. The secondary host of *Schistosoma haematobium, Bulinus truncatus,* is shown to have been widespread in central Iraq for 6000 years.
" 4. The existence of *Schistosoma haematobium* in Iraq in historic or prehistoric times, though not definitely proved, seems to be probable."

AZAR, J. E., SCHRAIBMAN, I. G. & PITCHFORD, R. J. **Some Observations on *Schistosoma haematobium* in the Human Rectum and Sigmoid.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1958, Nov., v. 52, No. 6, 562–4.

Though it has repeatedly been confirmed that *Schistosoma haematobium* eggs can be recovered by rectal biopsy, no statements have been made on the viability of the eggs so recovered.

Sigmoidoscopic biopsies of the rectum and of the sigmoid of 263 male Bantu schoolchildren (12 to 19 years old) were done in the Eastern Transvaal. The snips were taken from the anterior wall of the rectum at some 7 cm. above the anus, and from the sigmoid at about 17 cm. Squash preparations of these showed *S. haematobium* eggs in 224 (85%) of the patients; 9 of these patients did not have eggs in the urine. Of the 224 patients with positive biopsy findings only 13 yielded viable ova in these specimens.

Passive haphazard distribution of these eggs from the vesical veins to the rectal veins is probably insignificant; no evidence of venous intercommunication between bladder and rectum could be demonstrated on detailed anatomical dissection, or by cannulation of the vessels, of Bantu subjects at autopsy. The eggs in the wall of the bowel must come from adult worms located there; their probable migratory passage from the liver is outlined. *A. R. D. Adams*

CHEEVER, A. W. & WELLER, T. H. **Observations on the Growth and Nutritional Requirements of *Schistosoma mansoni in vitro.*** *Amer. J. Hyg.* 1958, Nov., v. 68, No. 3, 322–39, 5 figs. [27 refs.]

The present experiments were undertaken to evaluate the importance of different nutrient factors on the growth of *Schistosoma mansoni in vitro.* For this purpose schistosomulae measuring 0·5–1·0 mm. in length were obtained from mouse liver or peritoneum 16–18 days after intraperitoneal infection of the host with cercariae. The worms were then kept in an appropriate medium at 35°C. under sterile conditions. It was possible to manipulate the culture tube so that camera lucida drawings could be made of the parasites and their length was recorded weekly. Various types of media were used; for culture studies a mixture of 45% Hanks solution, 45% bovine amniotic fluid, 5% horse serum and 5% beef embryo extract was found useful. Human and horse serum was inactivated for half an hour at 56°C. before use. Human red cells were

used intact and also the membranes and soluble portions which resulted from haemolysis. The preparation of chick embryo extract and other special components of culture medium, to which antibiotics were generally added, are described. The medium was maintained at *p*H 7·3–7·7 over the experimental period of 4 weeks and was replaced each week.

The presence of intact red cells proved highly beneficial for growth. The responsible factor appeared to be present with the red cell membranes rather than in the soluble portion. Human serum and also that of horse, after absorption with human red cells to remove an agglutinating agent, were favourable for growth and likewise chick embryo extract. In the defined medium of MORGAN *et al.* (*Proc. Soc. Exper. Biol. & Med.*, 1950, v. 73, 1) growth did not take place, but when human serum was added the defined medium proved better than Hanks solution under the same conditions. The longest survival period in absence of growth was 49 days and occurred in the above defined medium to which globin had been added. In growth medium the worms survived almost indefinitely. The addition of albumin, haemin, haemoglobin, etc., was not beneficial. The effect of *p*H changes on growth in culture between *p*H 7 and 8 was negligible. In the authors' views the growth rate of young worms was a good criterion of the value of a medium. Worms obtained from liver grew better than those obtained from the peritoneum of mice. However, under the above conditions the schistosomulae in *in vitro* conditions did not attain full size or sexual maturity and failed to produce ova. *J. D. Fulton*

PELLEGRINO, J. **The Intradermal Test in the Diagnosis of Bilharziasis.** *Bull. World Health Organization*. Geneva. 1958, v. 18, Nos. 5/6, 945–61, 1 chart. [Numerous refs.]

This paper reviews the immunological skin tests used in the diagnosis of schistosomiasis devised because the recovery of eggs in the faeces or urine of man is often difficult in the later stages of the disease.

The various procedures for obtaining material for the preparation of the various antigens from cercariae, adult worms, eggs or miracidia are described. The value of the different antigens is assessed in epidemiological studies, and as criteria of cure.

The author believes that further studies are required, particularly on the standardization of materials and methods.

[Some 50 references are quoted in this review which does not lend itself to abstraction.] *W. E. Kershaw*

KAGAN, I. G. & OLIVER-GONZÁLEZ, J. **Hemagglutination Studies with Schistosome Antigens.** *J. Parasitology*. 1958, Oct., v. 44, No. 5, 457–60. [11 refs.]

The haemagglutination technique is assessed in schistosomiasis as a method for the detection of stage specific antibodies, for assessing a cure and for diagnosis. [See also this *Bulletin*, 1955, v. 52, 459; 1955, v. 52, 985; 1956, v. 53, 615.]

Antisera prepared in rabbits against whole eggs and extracts of cercariae and adults of *Schistosoma mansoni* were tested with homologous and heterologous

antigens. The sera were those used previously in precipitin tests and in the investigation of stage specific antibodies. Cross-reactions occurred with these sera and the egg antigens of *S. mansoni, S. haematobium* and *Schistosomatium douthitti* and cercarial and adult antigens of *S. mansoni*. In some of the experiments, the precipitating ring test titres were higher than the haemagglutination test titres.

The sera of 5 children infected with *S. mansoni* gave haemagglutination tests positive at higher titre with egg antigen than with cercarial or adult antigens.

The sera of 10 adults, obtained during infection with *S. mansoni* and one year after cure, gave positive haemagglutination reactions with egg antigens and antigen made from metabolic products of adult worms in 4 cases during infection but not after cure.

With the development of more potent metabolic antigens the haemagglutination test may be useful in the assessment of cure. [The details of the techniques and the results are given in full.] *W. E. Kershaw*

KOMIYA, Y. & KOJIMA, K. **A Crossing Experiment of** *Oncomelania nosophora* **with** *O. hupensis* **(Preliminary Report).** *Japanese J. Med. Sci. & Biol.* 1958, June, v. 11, No. 3, 185–6.

KUO and MAO [this *Bulletin,* 1958, v. 55, 184] recommended that Chinese forms of *Oncomelania* should be included in a single species, *O. hupensis,* thus differing from the Japanese vector of *Schistosoma japonicum,* namely *O. nosophora.*

The present authors, from Tokyo, have conducted experiments in the crossing of these 2 species of snails. Since 1956 they have been rearing *O. nosophora* from an endemic area in Yamanashi Prefecture, Japan, and *O. hupensis* from Kwangtung Province, China. In their laboratory, young offspring (shell less than 3 mm. long) were reared separately in a Petri dish for a short time. In October 1957, before sexual differences had been recognized, specimens of each species were put together in a Petri dish. In all, 16 pairs of both species were isolated for mating, irrespective of sexual differences.

At the end of May 1958, 12 offspring were identified in one dish. Their shells measured 1 to 1·5 mm., while the shells of the parent snails were more than 7 mm. long, which indicated that they had been sexually mature. In the present case the male parent was *O. nosophora* and the female was *O. hupensis.*

The $F_1$ offspring developed vigorously and attained shell lengths of 6·2 to 7·6 mm. at the end of September 1958. The hybrids resembled *O. nosophora,* having no or only faint stria on their shells, but the colour of the shell was nearer to that of *O. hupensis.* *H. J. O'D. Burke-Gaffney*

BIAGI F., F., PORTILLA, J. & TAY, J. Observaciones sobre fasciolosis y otras helmintiasis humanas en Atlixco, Puebla. [**Observations on Fascioliasis and Other Worm Diseases in Atlixco, Mexico**] Reprinted from *Prensa Med. Mexicana.* 1958, Aug., v. 23, No. 8, 4 pp. [19 refs.]

The English summary appended to the paper is as follows:—

"After the diagnosis of a case of fascioliasis from Atlixco, State of Puebla (Mexico), an investigation was performed in this locality revealing 5 other human cases; in fecal examination, *Fasciola* was encountered in 0·6 per cent.

"The search for fascioliasis in persons with high eosinophilia was successful (two cases in 11 persons). Main clinical data are accounted. The need for the physician to consider this entity in his differential diagnosis is stressed.

"In Atlixco, Pue., there are reservoirs and adequate ecological environment. We have encountered the snails *Physa osculans* and *Helisoma tenuis*. Among this population the habit of eating watercress (*Nasturtium*, and others) exists.

"Data of some intestinal helminthiasis of this population are also presented."

BOTERO, D. & GOMEZ, J. J. **The First Case of Sparganosis in Colombia.** *Amer. J. Trop. Med. & Hyg.* 1958, Nov., v. 7, No. 6, 597–9, 2 figs. [14 refs.]

The authors report the first case of sparganosis in Colombia, which is also the third case reported from South America. They refer to earlier literature on sparganosis in various countries.

The patient was a white girl, aged 18, coming from an unhygienic environment in a temperate, rural area, where she had lived in close contact with dogs, cats, pigs, chickens, etc. Her diet was deficient in protein and she drank water from an open spring. She had never been out of Colombia. She had a protrusion of the left eye, accompanied by a burning sensation, conjunctival congestion and oedema of the upper eyelid, but no impairment of vision. The fundi were normal. The condition had developed over 1½ years. In the upper nasal angle there was a cream-coloured lump about 3 cm. in diameter surrounded by hyperaemia. X-ray examinations of the skull, optical cavities and paranasal sinuses were negative, as were also the blood chemistry and Wassermann reaction; but there were eggs of *Ascaris lumbricoides* and *Trichuris trichiura* in the stools. An unidentified plerocercoid 9 cm. long by 3 mm. wide was removed from the swelling; it is described and photographs of it and of the corpuscles of $CaCo_3$ in its body matrix are given.

Discussing the modes of infection the authors refer to earlier literature and say that, although the use of infected meat from the intermediate hosts is not rare in Colombia, where it is a popular custom "to rub frogs" for the treatment of erysipelas, this patient denied having used frogs, reptiles or other animals as poultices and she usually ate cooked meat. Investigating the possibility that she had swallowed *Cyclops*, the authors could not find eggs of *Diphyllobothrium* in the stools of dogs, cats, cattle, horses or pigs, or *Cyclops* in the water the patient drank.

Sparganosis of the human eye seems, they say, to be rare in the Western Hemisphere and they could not find a report of a case in the Americas; but HOUDEMER *et al.* (*Ann. d'Occul.*, 1934, v. 171, 311) describe several cases of it in Indo-China and JOYEUX *et al.* [this *Bulletin*, 1940, v. 37, 216] reported 14 cases from Tonkin, where the commonest site is the eyelids, under the conjunctiva, "retrobulbar and periocular". Penetration of the eyeball by a sparganum has, however, not been reported. *G. Lapage*

WEGMANN, T. & FÜRST, C. Neuere Aspekte der Echinokokkenkrankheit. [**Newer Aspects of Hydatid Disease**] *Schweiz. med. Woch.* 1959, Jan. 10, v. 89, No. 2, 32–7, 3 figs. [11 refs.]

The English summary appended to the paper is as follows:—

" Within the past 9 months we were able to observe 3 cases of echinococcosis in our clinic. 2 prior cases are included in this report. Three patients were afflicted with E. alveolaris in the liver, while the other two had cystic e. of the lungs, that had perforated into the bronchial tree. The two types of e. differ distinctly in their geographical distribution, morphology, their clinical and pathologic-anatomical manifestations, as well as in their prognosis and treatment. The diagnosis of hepatic alveolar e. is often very difficult. The Casoni skin test and the Weinberg complement binding reaction with the specific antigens are helpful, but frequently not conclusive. The disease can be identified histologically by puncture of the liver, finding of scolices in the cystic content or sputum. Wherever possible radical resection of the affected tissue should be performed. The often cited chemotherapy with thymol seems to fail frequently."

JUMINER, B. L'ankylostomose dans le secteur du Maroni (Guyane Française). [**Ankylostomiasis in the Maroni Sector, French Guiana**] *Arch. Inst. Pasteur de Tunis.* 1958, Sept.–Dec., v. 35, Nos. 3/4, 349–63, 1 chart. [11 refs.]

Climatic and geographical factors in the Maroni sector of French Guiana favour the propagation of ankylostomiasis. *Ancylostoma duodenale* infection, which is presumed to have been imported during the 18th century, is very common at all ages and in both sexes. The severity of infection was assessed by counts of ova per gm. of faeces. In the absence of complications, no treatment was given to persons with ova counts of less than 300 per gm. The main symptom of infection was anaemia, often severe in children. In adults erythrocyte counts usually remained high even with ova counts of over 6,000 per gm., a fact suggesting the development of a state of premunity after many years of infection. Eosinophilia was seldom a feature.

The efficacy of treatment with tetrachlorethylene, diethylcarbamazine and oil of chenopodium was assessed by comparing ova counts taken before and 2 days after treatment. Tetrachlorethylene was the most efficient, causing a decrease of 90% or more in ova counts regardless of the severity of infection. It was, however, somewhat toxic. The efficacy of diethylcarbamazine fell off as the severity of infection increased, but it caused 50% reduction in ova counts in infections of up to 12,000 per gm. Length of treatment with diethylcarbamazine, 10 days, was a disadvantage, but it could be administered safely even to patients with extreme degrees of anaemia. Chenopodium was effective only in mild infections of up to 3,000 ova per gm., but as it lacked the disadvantage of prolonged treatment period, it continued to have its uses. In the treatment of anaemia, excellent results were obtained with a combination of iron, liver extract and vitamin B12. *B. B. Waddy*

SILVERMAN, P. H. *In vitro* **Cultivation of the Histotrophic Stages of** *Haemonchus contortus* **and** *Ostertagia* **spp.** [Correspondence.] *Nature.* 1959, Jan. 17, v. 183, 197.

BIAGI F., F., SOTO, R., DORANTES, S., VÁZQUEZ, Judith, PORTILLA, J. & CASTREJÓN, Olga. Estudio de casos de eosinofilia elevada con manifestaciones viscerales, de etiología obscura. II. Bronconeumonía por *Ascaris lumbricoides*. **[Study of Patients with Eosinophilia showing Visceral Manifestations of Obscure Aetiology. II. Bronchopneumonia from *A. lumbricoides*]** Reprinted from *Bol. Méd. Hosp. Infantil.* Mexico. 1958, v. 15, No. 4, 537–45. [10 refs.]

The English summary appended to the paper is as follows:—

"A case of bronchopneumonia accompanied by respiratory insufficiency, high eosinophilia and mild fever is presented. Three months after the onset, Ascaris lumbricoides eggs were found in feces and the precipitin reaction with antigen of this helminth was positive; previous investigations were negative.

"Difficulties for the etiological diagnosis are commented on; in clinical cases similar to the present, helminth infection should be considered in differential diagnosis. The search for larvae in bronchial secretion may corroborate the diagnosis in the first days of evolution."

AREAN, V. M. **Ascaridic Granuloma. An Experimental Study.** *Arch. Pathology.* 1958, Oct., v. 66, No. 4, 427–38, 17 figs. [29 refs.]

"Experimental inoculation of Ascaris lumbricoides eggs into the liver of [normal] rabbits results in an inflammatory reaction, the severity of which is proportional to the size of the inoculum. The lesions were induced in the absence of bacteria or products of the adult parasite.

"The characteristic cells of the early stages of inflammation are eosinophils. These are followed within 16 hours by increasing numbers of monocytes, giant cells, and fibroblasts. Pseudotubercle formation becomes apparent about the end of the first week after inoculation.

"Healing takes place by hyalinization with more or less extensive fibrosis, depending on the number of eggs present at the particular site. In lesions resulting from large inoculums, abscess formation is apparent within 16 hours after the inoculation.

"The similarity of the lesions induced experimentally to those reported in human infections is discussed."

WILSON, T., EDESON, J. F. B., WHARTON, R. H., REID, J. A., TURNER, L. H. & LAING, A. B. G. **The Occurrence of Two Forms of *Wuchereria malayi* in Man.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1958, Sept., v. 52, No. 5, 480–81.

In Kedah and Penang in the north-west of Malaya the microfilariae of *Wuchereria malayi* have a nocturnal periodicity in the blood of man; in Pahang, to the east, they are commonly semi-periodic [this *Bulletin,* 1958, v. 55, 293]. The belief that there are two forms of *W. malayi* in Malaya is

supported by other differences which characterize the periodic and semi-periodic forms. These are tabulated as follows:—

| *Feature* | *Periodic form* | *Semi-periodic form* |
|---|---|---|
| Microfilarial periodicity | Markedly nocturnal: microfilariae rarely found during day | Some nocturnal rise but microfilariae readily found at all times |
| Microfilarial appearances in Giemsa-stained blood films | Empty sheaths common: few microfilariae still enclosed in sheath | Empty sheaths very rare: many microfilariae still enclosed in sheath |
| Formalin-fixed microfilariae | Greater mean length | Shorter mean length |
| Experimental mosquito infections | Highly infective to *Anopheles barbirostris*: does not develop readily in *Mansonia longipalpis* | Does not develop readily in *A. barbirostris*; highly infective to *M. longipalpis* |
| Natural vectors | *A. barbirostris, hyrcanus* group; *M. indiana, uniformis, annulifera* | *M. longipalpis, annulatus, uniformis* |
| Experimental infections in cats | Does not develop well and microfilaria count remains low | Infections readily established, with high microfilaria counts |
| Natural infections in cats | Rare | Common |
| Terrain | Coastal ricefields and open swamp | Fresh water swamp forest |

*J. J. C. Buckley*

## NOTE

In the account of the Sixth International Congresses on Tropical Medicine and Malaria, Lisbon [this *Bulletin*, 1959, v. 56, 249] a reference is made to the "Pahang strain of *Wuchereria malayi* (which is now regarded as a separate species, *W. pahangi*)".

This is wrong. *W. pahangi* is the name given by BUCKLEY and EDESON [this *Bulletin*, 1956, v. 53, 1156] to a species found in a dog and a cat, and it has been differentiated from the form of *W. malayi* which occurs in man and (naturally) in cats in Malaya and which is semi-periodic in habit. The latter was originally referred to as the "Pahang strain of *W. malayi*", but this name has now been abandoned as confusing and inaccurate.

These filarial worms may be grouped as follows (WILSON *et al.*, *Trans. Roy. Soc. Trop. Med. & Hyg.*, 1958, v. 52, 480):—

*W. malayi* *periodic form*; found in man but does not develop well in cats; transmitted by *Anopheles barbirostris, hyrcanus* group, *Mansonia indiana, uniformis, annulifera*. In coastal ricefields and open swamp.

*semi-periodic form*; found in man and commonly in cats; transmitted by *M. longipalpis, annulatus, uniformis*. In fresh-water swamp forest.

*W. pahangi* found in dogs, cats and certain wild animals in Malaya; hitherto not found in man.

AUSTIN, W. C., LUNTS, L. H. C., POTTER, M. D. & TAYLOR, E. P. **Chemotherapeutic Properties of some New Quaternary Ammonium Salts. Part I. Chemistry.** *J. Pharmacy & Pharmacol.* London. 1959, Feb., v. 11, No. 2, 80–93. [22 refs.]

HAWKING, F. & TERRY, R. J. **Part II. Antifilarial Action against** *Litomosoides carinii*. *Ibid.*, 94–8.

i. "The preparation of a large number of new heterocyclic quaternary ammonium salts for biological screening is described. Certain of the quaternary salts possess amoebicidal, antibacterial, antifilarial and trypanocidal activity."

ii. "Several new quaternary ammonium salts have been tested for antifilarial activity against *Litomosoides carinii*, filarial parasite of the cotton rat. Many of these compounds are active in killing *L. carinii*; the most promising (BIQ 20) eicosane 1 : 20-bis(*iso*quinolinium iodide) and (BAC 20) eicosane 1 : 20-bis(4-aminocinnolinium iodide) possess an index (LD50 mice/minimum effective dose cotton rats) of 19 and 39 respectively. The compounds have a direct filaricidal action on the adult worms while the microfilariae are comparatively unaffected."

BUDDEN, F. H. **The Aetiology of the Ocular Lesions associated with Onchocerciasis. (An Assessment of the Symposium on Onchocerciasis.)** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1958, Nov., v. 52, No. 6, 500–508. [22 refs.]

This paper is largely a refutation of CHOYCE's paper given at the Symposium on Onchocerciasis [this *Bulletin*, 1958, v. 55, 925] and the controversy centres around two aspects of the ocular manifestations of the disease: first, the type and severity of corneal lesions in which the aetiology is not under dispute but in which the effect upon visual acuity and the resultant incapacity is the subject of argument; and second, lesions of the posterior segment, particularly a choroido-retinitis with choroidal atrophy in which the incapacity is not under dispute but in which the aetiology is argued.

The corneal opacities are described by Choyce as having a "snow-flake" appearance, occurring predominantly near the limbus, rarely vascularized and only rarely capable of seriously diminishing the visual acuity. Budden describes the early lesion as fluffy, but emphasizes that in heavy infections the lesions in the substantia propria appear to coalesce forming a confluent opacity which may invade the pupillary area causing reduced vision and blindness. Budden's extensive experience in Northern Nigeria as opposed to Choyce's visit to Southern Nigeria and his observations in England, might lead one to agree that at least in Northern Nigeria and in African subjects the corneal opacity may be dense and incapacitating, and the French School, from epidemiological evidence in the French Sudan, supports this view.

The question of iritis need not be a matter for dispute for it is recognized that any lesion of the cornea is likely to excite irritability of the iris and that chronic infections of the cornea invariably bring about iridocyclitis; and secondary glaucoma is a frequent sequal of posterior synechiae even in the absence of a complete iris bombé. Posterior segment lesions even of an agreed aetiology are protean in their manifestations. Certain characteristics are generally accepted as being pathognomic of a given aetiology, for instance the

pigmentation in primary pigmentary degeneration (retinitis pigmentosa), but there are cases in which all the other cardinal signs of this disease are present but which are nevertheless *sine pigmento*. Budden's description of the fundus lesions in onchocerciasis and, in particular, that which he calls "choroidal exposure and sclerosis", seems to take within its ambit the Bonjongo fundus and the fundi described by RIDLEY and others. Bonjongo is a dead-end village, both topographically and sociologically, and in-breeding might well favour the development of a dominant hereditary disease of the type of Sorsby's generalized choroidal sclerosis. There were only 5 patients seen to have this condition in Bonjongo and their possible sibship is not cited. Even assuming, and it is a considerable assumption, that this fundus is an hereditary choroidal sclerosis there is no reason why, especially in Africa with its multiplicity of infections, it should not co-exist in the same village or even in the same subject with an acquired infection or infections.

The surveys conducted by Budden in Northern Nigeria demonstrate the quantitative relationship between the incidence of lesions which cause blindness, with emphasis on posterior segment lesions, and the intensity of onchocercal infection in the area. Budden quotes the incidence of similar lesions in America and the French workers are equally insistent that there is a high incidence of these lesions in onchocercal villages and a complete absence in a non-onchocercal village *in the same area.*

The path by which the microfilariae reach the posterior segment may not be clearly defined but it will be recollected that BECKER [this *Bulletin,* 1950, v. 47, 646] reported the finding of adult onchocerca in the region of the inguinal canal, between the layers of abdominal muscles and in uterine muscle. Simpler still, the suprachoroidal space offers an avascular channel of communication between the anterior and posterior segments.

Budden concludes his paper by stating that he has examined and found unconvincing the recent suggestions that the anterior segment lesions are unimportant causes of blindness and that the fundus lesions are due to other causes.

[Few diseases can be satisfactorily explained as arising from one clearly defined cause. The statement is accepted without question that in England the second most common cause of blindness in the higher age-groups is senile macular degeneration. The statistics are obtained relatively easily; the clinical diagnosis is straightforward; but a profound difficulty arises when an attempt is made to classify the clinical condition according to its aetiology, whether abiotrophic, dystrophic, neurotrophic, vascular, toxic, inflammatory or infective and, if of the last named groups, where the primary focus may be supposed to lie. Tissue for a biopsy cannot be obtained from the retina but the aetiology of renal or diabetic retinopathy is not disputed. It would seem therefore to be bold to deny the importance of the role played by the onchocerca in the production of posterior segment lesions so often found in onchocerciasis, in the face of widespread clinical and epidemiological evidence.

However much a new point of view may be welcomed it would be unfortunate if a too-ready deviation from the established view were to result in any immediate modification of the plans for the control of onchocerciasis.

The old adage may hold good "Behold the turtle, he makes progress only when he sticks his neck out" but it may be hoped that he can stick his neck out for argument without exciting too much acrimony.] *A. McKie Reid*

CROSSKEY, R. W. **First Results in the Control of *Simulium damnosum* Theobald (Diptera, Simuliidae) in Northern Nigeria.** *Bull Entom. Res.* 1958, Dec., v. 49, Pt. 4, 715–35, 2 maps & 1 fig. [32 refs.]

*Simulium damnosum* was found to breed, during both the wet and dry seasons, along tributaries of the River Gurara and along the river itself, around Abuja in Northern Nigeria [this *Bulletin,* 1957, v. 54, 596]. Onchocerciasis is endemic and all the villages in a hilly area of about 1,200 square miles are infected. It was decided to treat the tributaries with DDT at 0·5 p.p.m. in river water, and this was expected to produce sterilization for about 40 miles downstream when delivered over a period of 30 minutes. Actual mean dosages used were 1·4 p.p.m. in 1956 and 1·0 p.p.m. in 1957. A 70% DDT mixture in diesel oil was applied at the end of the dry season when the rivers were low. At each treatment point the river received one application a week for 12 weeks. The methods of application are described in detail.

In the first year all breeding was prevented for 15–23 miles below the treatment points, and the adult fly density was reduced by 96%. The cleared areas were repopulated rapidly within 6 months after treatment, although the adult fly density in the wet season was as low as 0·35 flies per boy hour. In the second year, when the rivers were exceptionally low, the treatment was less successful, although three additional treatment points were used. The adult fly density, compared with the year before treatment, was reduced by 82%. It is believed that control of *S. damnosum* by larvicides in non-isolated foci is possible, but that annual treatment may be necessary in view of the rapid re-invasion of the treated areas.

The cost of the project is set out in a table, and the total expenditure in the two years was £2,096, of which £575 was used in constructing roads.

*B. R. Laurence*

See also p. 574, GILLIES, *Simulium* **in Southern Arabia.**

PAMPIGLIONE, S. Diffusione dell'enterobiasi tra la popolazione infantile di un piccolo centro contadino del Viterbese. [**Enterobiasis in Children in a Small Rural Town in Viterbo**] *Nuovi Ann. d'Igiene e Microbiol.* 1958, Sept.–Oct., v. 9, No. 5, 406–11. [26 refs.]

The English summary appended to the paper is as follows:—

"A parasitological survey carried out among the child population of the municipality of Castiglione in Teverina (province of Viterbo) according to Shindell & Biocca's proceeding with the 'Scotch-cellulose tape', evidenced by 124 out of 278 subjects (that is 44·60%), at the first proof, the presence of enterobiasis. Some epidemiological considerations are expressed."

## DEFICIENCY DISEASES

World Health Organization. Technical Report Ser. No. 149. **Joint FAO/WHO Expert Committee on Nutrition. Fifth Report, Rome, 22–29 October 1957.** 55 pp. [Refs. in footnotes.] 1958. Geneva: Palais des Nations. [Sales agent for U.K., H.M. Stationery Office.] [3s. 6d.; $0.60; Sw.fr. 2.–.] [Issued also as *FAO Nutrition Meetings Report Ser. No. 19.*]

The joint FAO/WHO Expert Committee on Nutrition have the task of advising the Directors-General of the two organizations of the problems which can properly be tackled by cooperative ventures and also on technical problems concerned with nutrition. The present report, which is submitted under 24 headings, gives a most satisfactory list of cooperative achievements and also outlines many possible programmes for future work. The report is intended primarily for civil servants rather than doctors and research workers, but the latter may find it a useful weapon for pressing their claims for support for their work.

The past record is impressive. First and foremost is the part played by both WHO and FAO in establishing that protein malnutrition is a disease of world-wide importance and outlining methods of prevention. In many parts of the world developments in education and training in nutrition have been marked and both WHO and FAO have lead the way in devising and organizing education for all levels—from the post-graduate doctor to the poor rural mother. The recording and analysing of national records of food consumption in a standard manner has been and continues to be an invaluable international service. The two reports on Requirements for Calories and Requirements for Proteins [this *Bulletin,* 1958, v. 55, 1267] are scientific documents of great value. The above are only the major achievements and much other good work has been completed.

With this record behind them, it seems unfortunate that the Committee could not be more critical in their future recommendations. The list of recommendations that have their blessing is very long and there seems little attempt to advise the Directors-General on priorities. The only way to be certain of losing money on a race is to put a shilling on every horse. Reading this report, one gets the impression that this is what the Committee has done. In the early days of both WHO and FAO, it was essential not to offend, even if this meant at times supporting incompetence. The scientific reputations of both organizations in the nutrition field are so well established that they are now in a position to give much more active leadership to research, especially in underdeveloped countries.

*R. Passmore*

Soc. Belge De Méd. Trop.: Nederl. Vereniging V. Trop. Geneesk. Symposium international de la nutrition dans les régions tropicales, Bruxelles, 16–17 et 18 mai 1958. **[International Symposium on Nutrition in Tropical Countries, Brussels, May 1958]** *Ann. Soc. Belge de Méd. Trop.* 1958, June 30, v. 38, No. 3, 389–509, numerous figs. [Numerous refs.]

The report of this Symposium is not entirely satisfactory. The Dutch speakers, H. A. P. C. Oomen, S. Postmus and R. Luyken, have chosen to publish their contributions in their mother tongue, yet all three are accomplished

linguists and, judging by the discussions which followed their papers, the original presentations were either in English or French; this unfortunately deprives most readers of the opportunity of following their work. B. S. PLATT described a variety of pathological processes arising in pigs on diets deficient in proteins and other nutrients. These included degenerative changes in the cornea and in the gastric mucosa. Unfortunately he does not give full details of the methods used in his experiments and the work cannot therefore be critically evaluated.

The report contains three contributions from Belgians, which were a pleasure to read. E. M. DEMAEYER's concise account of kwashiorkor in the Belgian Congo can be recommended to any young man going to Africa for the first time: it is valuable, not only for the factual information that it contains, but also as an example of how to write a scientific paper concisely and clearly. A. LAMBRECHTS and K. HOLEMANS give a long and scholarly account of the problems of calcium and phosphorus requirements. They found that in rural areas of the Congo mean dietary intakes of calcium were 11 mgm./kgm./24 hr., which is low by American and European standards. Yet there was no evidence to suggest that the people suffered in any way from lack of minerals. An intake of this order appears sufficient for adults, including pregnant women. However, it may not suffice for a prolonged lactation of 2½ years during which it may be necessary to draw on the mineral reserves in the bones to the extent of about 4·8%, and "this deficit is not catastrophic". It is suggested that indigenous people living on diets with little calcium are more nearly physiological than those who absorb larger amount of calcium from diets rich in the mineral. From a practical point of view the problem of calcium and phosphorus is not of major importance in the Congo, where the question of the supply of nitrogen remains predominant. M. VINCENT and M. A. RADERMECKER report briefly the results of histological examinations of muscle biopsies in kwashiorkor. There is an increase in the number and size of the nuclei in the sarcolemma. The muscle fibres become separated by oedema fluid. There is infiltration by lymphocytes. The fibres lose their striations and the sarcoplasm may then be broken into blocks: the fibre is then dead. These changes are shown in excellent microphotographs.

H. GOUNELLE gives a clear account of the poor state of nutrition of many women in Irak and the effect of this on their infants. The creation of a National Institution of Nutrition should provide the dynamic direction necessary for the research and popular education which are needed. Finally, Cicely D. WILLIAMS closed the symposium with the following characteristic remarks which cannot be repeated too often:

"I believe that to study nutritional diseases in isolation has its limitations. What is needed is collaboration between paediatrics, nutrition, tropical and social medicine. In general doctors and nurses working in the tropics need better training in paediatrics, in clinical nutrition and in methods of organisation."

*R. Passmore*

PÉRISSE, J., with the technical collaboration of P. O'CLOO & with P. A. KOMLAN, D. MENSAH, J. O'CLOO & J. HOUEDAKOR. Une enquête alimentaire sur les populations agricoles du Togo. [**Nutritional Survey of the Agricultural Population of Togo**] *Bull. Inst. Nat. Hyg.* Paris. 1958, Oct.–Dec., v. 13, No. 4, 945–1020, 1 map & 4 graphs. [45 refs.]

NICOL, B. M. **Ascorbic Acid in the Diets of Rural Nigerian Peoples.** *West African Med. J.* 1958, Dec., v. 7 (n.s.), No. 4, 185–9.

Significant amounts of ascorbic acid remain in yams, cassava and sweet potato after cooking. In the dry areas of Nigeria, various forest products (pulp and fruits) are eaten which contain ascorbic acid. The pulp of the baobab fruit (*Adansonia digitata*) is used to adulterate milk and, as it contains ascorbic acid 373 mgm./100 gm., is a valuable source of the vitamin.

*R. Passmore*

BASSIR, O. **Nutritional Studies on Breast Milk of Nigerian Women. (The Constitution of Breast Milk in the Third Year of Lactation.)** *West African J. Biol. Chem.* 1958, Oct.–Dec., v. 2, No. 3, 74–6, 1 fig. [12 refs.]

Samples of milk were obtained by manual expression from about 25 young peasant women in Nigeria during the third year of lactation. The content of fat, lactose, nitrogen and calcium was lower than in previously reported analyses of the milk of Nigerian women in the first year of lactation [this *Bulletin,* 1956, v. 53, 1373]. *R. Passmore*

GOPALAN, C. **Studies on Lactation in Poor Indian Communities.** *J. Trop. Pediatrics.* London. 1958, Dec., v. 4, No. 3, 87–97, 1 fig.

This paper is likely to be the standard work on human lactation in the tropics for a long time. The results were obtained from 14 poor South Indian women, whose diets consisted mostly of cereals. The women were admitted to hospital for 24 hours every 2 weeks throughout lactation (every week for the first 4 weeks) and their milk production measured by accurately weighing their babies. The quality of the milk was estimated by analysis of samples obtained by manual expression.

The mean daily output of milk was 454 gm. in the first week and rose slowly to just over 500 gm. by the 14th week. It stayed at this level usually for many months and began to fall in most women only after a year of lactation. Milk yield thereafter declined, but charts show that most women were giving 100–200 gm. daily at the end of 2 years.

The chemical composition of the milk towards the end of the second year of lactation was as follows: fat 3·3 gm.%, protein 1·1 gm.%, lactose 7·5 gm.%, calcium 36 mgm.%, thiamine 15·3 μgm./100 ml., riboflavin 19 μgm./100 ml., ascorbic acid 1·9 mgm./100 ml. and vitamin A, 79 i.u./100 ml. (mean values for 6 women).

The effect of increasing the protein content of the diet was studied on 6 women. The mean milk output rose from 402 to 515 gm./day when the dietary protein intake was raised from 61 to 99 gm./day. However, the protein content of the milk fell from 1·21 to 1·02 gm./100 ml. So little of the additional protein was passed on to the infants.

The remarkable ability of poor women to breast feed their infants successfully over long periods is one of the most gratifying features of the nutritional situation of Indian communities. There is an inverse relationship between adequacy of lactation and position in the social scale. Among Indian women in the highest social classes, 80% were unable to feed their babies even for 6 months. *R. Passmore*

OOMEN, H. A. P. C. **Nutrition and Environment of the Papuan Child.** *Trop. & Geograph. Med.* Amsterdam. 1958, Dec., v. 10, No. 4, 337–40.

This is an English version of a paper read at the International Symposium on Nutrition, Brussels, May 16–18, 1958. See above, p. 556.

CHITRE, R. G. & TIN TIN OO. **Role of Nutrition in Disease.** *Burma Med. J.* 1957, Apr., v. 5, No. 2, 21–30, 2 graphs. [Numerous refs.]

FUHRMANN, G. & THONNARD-NEUMANN, E. Die Aufdeckung kindlicher Mangelernährung in den Tropen durch einen modifizierten A.C.H.-Index. **[Detection of Malnutrition in Children in the Tropics by Means of a Modification of the ACH Index]** *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1958, v. 9, No. 3, 243–69, 9 figs. [10 refs.]

In 1934 FRANZEN and PALMER (*The ACH Index of Nutr. State,* 1934, New York: Amer. Child Health Ass.) devised a relatively simple method (somatometric index) to judge the state of the nutrition of children by measuring the arm girth, depth of chest and width of hips, and this method has become known as the ACH index.

The results of this test in children from the tropics (India, South and East Africa) were rather contradictory. Therefore the ratio between detection of malnutrition by the ACH index and by clinical methods was studied once more. The 865 children tested ranged from 6 to 14 years of age, from the coastal regions of Colombia (S. America). The following results were obtained. 11·3% of these children were selected as suffering from malnutrition by clinical examination. From this number some 42% were judged by the ACH index, whereas from the children not so "selected" by clinical inspection another 10% were chosen by the ACH index. These results were rather unsatisfactory and an attempt was made to convert the ACH index into a more suitable form. Therefore a subdivision of the investigated children into several age-groups and a slight modification of the original ACH table yielded a great improvement. From the children selected by clinical examination 72·5% were now correspondingly selected by the modified ACH index, whereas, on the other hand, only some 3·4% of the children not selected by clinical inspection were still retained by the modified index.

Therefore, the ACH index, when applied in its modified form, appears to be a recommendable method for rapid and sufficiently exact detection of malnutrition in great numbers of children. *Philip Manson-Bahr*

MCFIE, J. **Malnutrition in Uganda. Examination of an Official Statement.** *Lancet.* 1959, Jan. 10, 91–4. [27 refs.]

The author has been nutrition officer in Uganda for 2 years. An account of his work has already been abstracted in the *Bulletin* [1958, v. 55, 799]. In this paper he uses his experience to challenge the accuracy of a statement on Uganda made by the Under-Secretary of State for the Colonies in the House of Commons (*Hansard,* 1958, July 7). The author provides evidence from his

own experience which makes the point that malnutrition is much more widespread in the Protectorate than the Under-Secretary implied in his speech. He also criticizes complacency and failure on the part of the authorities to take effective measures to deal with the problem. *R. Passmore*

VAN DEN BERGHE, L. Troubles et lésions oculaires sensibles à l'application de vitamine A au Kivu. [**Ocular Lesions responding to Vitamin A in Kivu**] *Ann. Soc. Belge de Méd. Trop.* 1958, Aug. 31, v. 38, No. 4, 779–81, 1 fig. on pl.

The English summary appended to the paper is as follows:—

"The author points out the relative frequency of avitaminosis A in the higher regions of Ruanda-Urundi and Kivu.

"A moderate xerophthalmia with corneal opacification has been especially noted. Favourable results obtained by giving provitamin A per os and the instillation of vitamin A into the eye."

[See this *Bulletin,* 1958, v. 55, 1265.]

SARIN, B. P. **Observations on "Kwashiorkor" or Protein Undernutrition in Rangoon.** *Burma Med. J.* 1957, Apr., v. 5, No. 2, 1–7, 2 figs. [19 refs.]

The clinical features of 40 cases of kwashiorkor seen in children's clinics in Rangoon in 1956 are well described. There appears to be no marked difference from the disease as usually described in Africa. Xerophthalmia and keratomalacia were frequently present and led to permanent blindness in one eye in 3 children. A clear account is given of methods of preventing the disease and this stresses the need for development of the maternal and child health services in Burma. *R. Passmore*

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## HAEMATOLOGY

See also p. 511, HENDRICKSE & KING, **Anaemia of Uncertain Origin in Infancy.**

DODU, S. R. A. **Diabetes and Haemosiderosis—Haemochromatosis—in Ghana.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1958, Sept., v. 52, No. 5, 425–30. [14 refs.]

"1) Forty-four diabetics were successfully investigated for the presence of haemosiderosis by section of aspirated sternal marrow, and seven were found to have heavy pigment deposits in the marrow. Liver biopsy was successful in six of the seven: four (i.e., 9·1 per cent. of the total investigated) were classified as haemochromatosis and one as early haemochromatosis. The remaining patient had iron pigment in the Küpffer cells only, in spite of heavy marrow siderosis. All the four patients with established haemochromatosis were males aged between 39 and 56 years. Biochemical tests of liver function and skin

biopsy were of little help in diagnosis, but a large, hard liver and fairly severe diabetes with loss in weight were constant clinical findings.

" 2) It is concluded that haemosiderosis is not uncommon among diabetics in Ghana, and the combined malady of diabetes and advanced haemosiderosis is clinically and histopathologically indistinguishable from idiopathic haemochromatosis."

[See this *Bulletin,* 1954, v. 51, 1095.]

NEWMAN, C. G. H. **Intraperitoneal Transfusion of Blood in a Child with Cooley's Anaemia.** *Lancet.* 1959, Jan. 31, 230–32, 2 figs. [13 refs.]

" A child with thalassaemia major was given intraperitoneal transfusions of citrated whole blood on five occasions between the ages of 14 and 15⅓ months. 23–30% of her calculated blood-volume was given at each transfusion.

" On three out of five occasions the effect of these transfusions was highly satisfactory. By the 3rd day it was comparable to the effect of intravenous transfusion of the same amount of blood. Possible reasons for the reduced haemoglobin response on the last two occasions are discussed.

" There were no undesirable side-effects, nor did there appear to be undue discomfort. At laparotomy for splenectomy, 47 days after the first transfusion and 6 days after the last, the peritoneum was found normal. Absorption of the blood had been almost complete.

" In children where there is difficulty in finding veins suitable for injection, intraperitoneal transfusion may be the method of choice. It deserves further and extensive study."

RIBEIRO DO ROSÁRIO, M. & MAGALHÃES COLLAÇO, F. Nosografia da hemoglobina " S " em Portugal continental. Estudo familiar de dois casos de anemia de células falciformes. [**Haemoglobin S in Continental Portugal. Family Study of Two Cases of Sickle-Cell Anaemia**] *Gaz. Méd. Portuguesa.* 1958, Sept.–Oct., v. 11, No. 5, 541–54, 10 figs. [33 refs.] English summary.

Both patients were Portuguese, apparently of white skin.

VELLA, F. & YEOH OON SWEE. **Haemoglobin E-Thalassaemia in Two Unrelated Chinese Patients.** *Proc. Alumni Ass., Malaya.* 1958, Dec., v. 11, No. 4, 159–65, 6 figs. [12 refs.]

TRINCÃO, C., DE ALMEIDA FRANCO, L. T. & NOGUEIRA, A. R. **Haemoglobin N in Portuguese Guinea.** [Correspondence.] *Nature.* 1959, Jan. 17, v. 183, 193–4, 1 fig.

Haemoglobin N [this *Bulletin,* 1958, v. 55, 936] is a rare type. The authors, from Lisbon, have however found it in 14 Africans during a survey of abnormal haemoglobins in Portuguese Guinea in which 9,224 samples of blood were examined. The mobility of the first sample on paper electrophoresis is

illustrated. [This was classified by LEHMANN and subsequent samples were classified by the authors.]

In random samples of blood haemoglobin N was found in the following tribes in Portuguese Guinea: Fula, 4 cases (1,553 samples); Beafada, 1 (797); Pajadinca, 2 (300); Sôsso, 2 (94); Balanta, 1 (776); Mancanha, 1 (534); Manjaco, 3 (758).

The first four tribes are Moslems and the remainder Fetichists.

*H. J. O'D. Burke-Gaffney*

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## VENOMS AND ANTIVENENES

MARX, H. **Egyptian Snakes of the Genus** *Psammophis*. *Fieldiana: Zool.* 1958, Sept. 22, v. 39, No. 18, 191–200, figs. 30–31.

RENOUX, G. & JUMINER, B. Préparation et titrage du sérum antiscorpionique. [**Preparation and Titration of Anti-Scorpion Serum**] *Arch. Inst. Pasteur de Tunis.* 1958, Sept.–Dec., v. 35, Nos. 3/4, 365–76, 2 graphs.

The following is a translation of the authors' summary:—

A description is given of a method of immunizing horses with anavenenes for preparation of anti-scorpion serum. It allows a satisfactory serum to be obtained after 2 months and the inoculation of only about 210 telsons.

Titration of the serum was made with reference to the anti-scorpion serum of the Pasteur Institute of Algeria and the method of BONET-MAURY *et al.* [*Bull. Hyg.*, 1954, v. 29, 863] was used for determining the LD50. This method seems to be simpler and more economical than that of IPSEN. The results of the LD50 determination are readily reproducible.

*H. J. O'D. Burke-Gaffney*

CANTORE, G. P.; BETTINI, S. Contributo allo studio dell'azione farmacologica del veleno di *Latrodectus tredecimguttatus* Rossi [CANTORE]. *Riv. di Parassit.* Rome. 1958, Apr., v. 19, No. 2, 158–60, 2 figs. [13 refs.] II. Azione sulla muscolatura bronchiale [CANTORE & BETTINI]. *Ibid.*, Oct., No. 4, 297–300, 1 fig. [27 refs.] III. Azione sul ritmo cardiaco e sul circolo arterioso [CANTORE & BETTINI]. *Ibid.*, 301–6, 1 fig. [39 refs.] [**Study of the Pharmacological Action of the Venom of** *Latrodectus tredecimguttatus*. **II. Action on the Bronchial Muscles. III. Action on the Cardiac Rhythm and on the Arterial Circulation**]

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## TOXOPLASMOSIS

SKIELLER, Lise & SMETANA, H. F. **A Pilot Study concerning the Incidence of Toxoplasmosis in the Delhi Area and its relationship to Eating Habits of the Population.** *Indian J. Med. Res.* 1958, May, v. 46, No. 3, 390–95. [Numerous refs.]

The toxoplasmin skin test was applied to Indians living in the Delhi area and the results were classified in groups of vegetarians and meat eaters. In 168 children, 2 positive skin reactions were observed—one in a vegetarian, the other in a meat eater; in 120 adults 6 positive reactions (5 skin, 1 dye test) were found, 5 of them in meat eaters and 1 in a vegetarian. The authors rightly conclude that a larger survey will have to be done before firm conclusions can be drawn on the importance of eating meat in the epidemiology of the disease.

*P. C. C. Garnham*

WEINMAN, D. & CHANDLER, Anne H. **The Specificity of the *Toxoplasma* Dye-Test with Survey Data on the Local (New Haven) Area.** *Yale J. Biol. & Med.* 1958, Nov., v. 31, No. 2, 74–9, 1 fig. [12 refs.]

Of 88 people of both sexes in New Haven, Connecticut, above the age of 21, chiefly healthy blood donors, 21·3% gave a positive dye test for toxoplasmosis. In the same area, with the same methods and criteria, 21·8% of 32 women proved to be infected with *Trichomonas vaginalis* gave a positive dye test. There is no evidence, therefore, of any serological cross-reaction between the two parasites.

[See also this *Bulletin,* 1957, v. 54, 1238.] *I. A. B. Cathie*

RAWAL, B. D. **Laboratory Infection with *Toxoplasma*.** *J. Clin. Path.* 1959, Jan., v. 12, No. 1, 59–61. [19 refs.]

"The writer reports the course of his own laboratory infection with *Toxoplasma* and reviews 17 others.

"Headache, malaise, and lymphadenopathy were the commonest symptoms and signs.

"The need for care when working with *Toxoplasma* is stressed."

BRUHL, H. H., BAHN, R. C. & HAYLES, A. B. **Sexual Precocity associated with Congenital Toxoplasmosis.** *Proc. Staff Meetings Mayo Clinic.* 1958, Dec. 24, v. 33, No. 26, 682–6, 3 figs.

Report of a case.

## DERMATOLOGY AND FUNGUS DISEASES

LEONG HON KOON & KHOO OON TEIK. **Porokeratosis (Mibelli) in Singapore. Report of a Case.** *Proc. Alumni Ass., Malaya.* 1958, Dec., v. 11, No. 4, 147–56, 13 figs. (3 coloured on pl.) [14 refs.]

" A case of Porokeratosis (Mibelli) in a Chinese in Singapore is described. The lesion present fell naturally into two varieties, the flat ring variety in the covered parts of the body, and the characteristic well-defined dyke lesions in the hands and feet and more exposed parts of the body. Porokeratosis is a rare chronic progressive non-fatal disease of hereditary origin, of unknown aetiology and without a known cure."

GONZÁLEZ OCHOA, A. & AHUMADA PADILLA, M. Tratamiento del micetoma actinomicosico por la inyeccion local de la diaminodifenilsulfona. [**Treatment of Mycetoma with Local Injections of DDS**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1958, Mar., v. 18, No. 1, 41–4. English summary (5 lines).

The English summary appended to the paper is as follows:—

" Four cases of mycetoma by *Nocardia brasiliensis* are reported; these cases were treated with local injections of diamino-diphenyl-sulphone (DDS) on a daily dose of 2 c.c. (20% solution). It was found that the successful action of the drug was more rapid by this procedure than by the oral route."

FURTADO, T. A. & BATISTA, G. Tratamento do pênfigo foliáceo por um novo cortico-esteróide: a triamcinolona. (Resultados preliminares.) [**Treatment of Pemphigus Foliaceus with a New Corticosteroid, Triamcinolone; Preliminary Results**] *Brasil-Médico.* 1958, Aug. 2–30, v. 72, Nos. 31/35, 335–41, 6 figs.

The English summary appended to the paper is as follows:—

" Triamcinolone (fluorinated derivative of prednisolone) was used in four patients with pemphigus foliaceus. After a period of treatment lasting from 14 to 24 days, complete involution of the cutaneous manifestations was obtained in three patients and improvement in one. The initial dose was 28 to 32 mgrs., the maximum average daily dose 15 mgrs. and the maintenance dose 8 mgrs. Usual side-effects of steroid therapy were not observed. These highly satisfactory preliminary results seem to indicate that triamcinolone is more active than the known corticosteroid hormones and justify the continuation of their use in a large number of patients with pemphigus foliaceus."

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## TROPICAL OPHTHALMOLOGY

See also p. 560, VAN DEN BERGHE, Troubles et lésions oculaires sensibles à l'application de vitamine A au Kivu. [**Ocular Lesions responding to Vitamin A in Kivu**]

TANG, Fei-Fan, HUANG, Yuan-Tung, CHANG, Hsiao-Lou & WONG, Kai-Chien. **Further studies on the Isolation of the Trachoma Virus.** *Acta Virologica.* Prague. 1958, July–Sept., v. 2, No. 3, 164–70, 7 figs. on pl.

A comparison was made of different concentrations of and periods of incubation with streptomycin in the treatment of eye-swab material for inoculation into the yolk sacs of embryonated eggs. A concentration of 1,000 units per ml. and incubation of the mixture at 4°C. for 4 hours was best and rendered 75% of specimens sterile. Virus was isolated from 9 of 22 such sterile specimens. Sterility is essential for successful virus isolation and the addition of contaminants to sterile material always prevented an isolation being made.

Attempts were made to isolate virus from 13 normal children aged 4–6 years and no isolations were made. 3 strains were successfully used to cause clinical trachoma in monkeys. The virus was re-isolated from a monkey 73 days after inoculation but not 86 or 100 days after inoculation. The virus was successfully freeze-dried in skimmed milk and found to survive at least 10 months.

Stained paraffin sections of infected yolk sacs are shown and discussed.

[See also this *Bulletin,* 1958, v. 55, 96; 1959, v. 56, 95.]

*C. E. Gordon Smith*

See also p. 553, BUDDEN, **The Aetiology of the Ocular Lesions associated with Onchocerciasis. (An Assessment of the Symposium on Onchocerciasis.)**

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## MISCELLANEOUS DISEASES

BENNETT, J. H., RHODES, F. A. & ROBSON, H. N. **Observations on Kuru: I. A Possible Genetic Basis.** *Australasian Ann. of Med.* 1958, Nov., v. 7, No. 4, 269–75, 2 figs.

Kuru, a common and severe syndrome involving the central nervous system, occurs in the Fore people in an area of New Guinea only recently accessible to Europeans. Various accounts have been given of the condition [this *Bulletin,* 1958, v. 55, 1048] but this is the first paper giving some data relative to the frequency and pattern of the condition in the population.

A survey was made of a series of villages believed to be representative and not selected because of prior knowledge of the pattern of kuru in the people. 1,186 people were identified and they had 913 relatives in a sib, parent or child relationship who had died and for whom a cause of death was given by relatives. Of these 913 deaths kuru was given as the cause in 204 cases (177 being females, including 21 children under 17, and 27 being males, including 19 children under 17 years of age). In 88 instances the cause was tokabu, which is a ritual murder of persons believed to have determined kuru by casting a spell on the victim. Of the tokabu deaths, 47 were male (+ 4 children) and 34 female (+ 3 children). Other causes, known or unknown, accounted for the remaining 621 deaths. Of these 356 were in males (including 76 children) and 265 were in females (including 58 children).

This evidence, together with other data recorded including the age and sex distribution of the living population, showing a marked relative deficiency of adult females, suggests convincingly that:—

(1) Kuru as recorded by relatives accounts for some 20% of all deaths.

(2) Whereas the proportion of deaths at all ages due to kuru is, in males, 6%, in females the condition accounts for 30% of deaths.

(3) Whereas about two-thirds of the deaths from kuru in males occur in childhood, only about one-eighth of such deaths in females occur before 16 years.

(4) Kuru appears to occur very frequently in the daughters of mothers recorded as dying from kuru, about a half of all deaths of daughters of affected mothers being due to kuru. In contrast, less than a quarter of the deaths of sons with affected mothers are due to kuru. However, affected males appear to be born almost exclusively to affected mothers.

The authors advance a genetical hypothesis in explanation of this pattern. It is that there is a single autosomal mutant gene which is dominant in females and recessive in males.

[This would of course require, if the mutant was fully penetrant, that all affected boys had both parents affected, and that all females had one parent affected. These conditions are not fulfilled; but by postulating failures of penetrance and varying ages of onset it could superficially be fitted to the observations recorded in the paper. However, the data as presented are not so set out as to make it possible for the reader to judge for himself, to suggest an alternative hypothesis or, most important of all, to look at the population pattern with environmental as well as genetical hypotheses in mind.

It must be recognized, however, that the assembly of data in such an area is an extremely difficult undertaking. The existing data presented as family protocols in conventional fashion in human genetics would be essential before adequate criticism could be made.

The aspect which is perhaps most antagonistic to a simple genetical hypothesis is not mentioned in the paper. It is the very high frequency of a condition which has a high mortality in both sexes and which determines such a loss to a population of women and young girls. Selection against the trait, the phenotype, is clearly high yet the mutant gene frequency must also be very high and remain high, in face of severe selection, to satisfy the genetical hypothesis. Such a high gene frequency could hardly be maintained by fresh mutations, and it would appear to require a very complex and artificial hypothesis of heterosis to maintain otherwise the gene frequency where the mode of inheritance is as suggested with so much exposure of the gene to selection in the heterozygote.] *A. C. Stevenson*

JÖHL, A. & STOLL, W. G. Zur Konstitution von Hypoglycin B. [**The Constitution of Hypoglycin B**] *Helvetica Chimica Acta.* Basle. 1959, v. 42, No. 1, 156–9. [Refs. in footnotes.]

[See this *Bulletin,* 1958, v. 55, 1050.]

METZ, J., KRAMER, S. & CASSEL, R. **Acute Idiopathic Thrombocytopenia in the Bantu.** *South African J. Med. Sci.* 1958, Aug., v. 23, No. 2, 93–100, 1 fig. [15 refs.]

Onyalai is a form of acute idiopathic thrombocytopenia (AIT) associated with haemorrhagic bullae in the mouth, which appears to be peculiarly prevalent among the Bantu races. The authors have studied the records of examples

of AIT investigated in two hospitals in Johannesburg between 1951 and 1956 in an attempt to determine whether (a) examples of this syndrome differ essentially from other Bantu patients suffering from AIT but without oral bullae, and (b) whether the syndrome differs essentially from AIT as seen in the European.

There were 60 Bantu patients who satisfied the criteria of AIT, of whom 35 were examples of the acute disease in a single attack. In these the duration of symptoms averaged 8·6 days, and their platelet counts returned to normal on hospital treatment within 5 days. 22 others were classified as probably acute, though their platelet count was not completely restored before their discharge from hospital. Recurrent AIT was diagnosed in 3 more patients, while 3 patients classified as " probably acute " died of haemorrhage within a few days of admission.

The series comprised 35 adults and 22 children [presumably the 3 fatal cases are omitted]. The adults were in the age range of 14–52 years, the children between 11 months and 12 years. The ratio of males to females was, in adults 1·7 : 1, in children 1 : 1·45.

All the patients presented an account of bleeding from mucous surfaces or into the skin, with the exception of 1 adult who complained of abdominal pain and 1 child with diarrhoea and vomiting. Bullae in the mouth (75%) and purpura (75%) were the commonest clinical signs; the spleen was palpable only in 4 instances and was never greatly enlarged.

The blood showed a degree of anaemia commensurate with the haemorrhage, the leucocyte count was normal or increased and the platelet count was less than 20,000 per cmm., except in 3 instances, when it was 35,000 per cmm. In the marrow megakaryocytes were present in every case and in 3 patients were abnormally abundant: in every instance, however, during the thrombocytopenic phase they were morphologically abnormal. The abnormalities observed comprised cytoplasmic hyalinization, " lymphoid forms " and conspicuous maturation arrest, with failure of the process by which platelets are budded off. Coomb's test was always negative and " LE " cells could never be demonstrated.

Recovery was announced by the cessation of bleeding. This occurred within 11 days in 56 patients (mean 5 days), but in a single patient haemorrhage persisted for just over 1 month. In the 3 who died, uncontrollable haemorrhage was the cause of death in 2 and cerebral haemorrhage in the third.

Treatment was either supportive (rest, sedation and blood transfusion) or " specific ", by which was meant the use of cortisone, corticotrophin, antihistamines, Adrenosen (carbazochrome salicylate) or autohaemotherapy. No form of " specific therapy " led to the cessation of haemorrhage within 48 hours or showed any advantage over supportive treatment.

Of the surviving patients, 43 had bullae in the mouth and 14 had none: except in this feature the two groups were indistinguishable, for their age and sex distribution and clinical features showed no differences. In the two groups, changes observed in the blood and marrow were also identical.

The onyalai syndrome in the Bantu differs in only two respects from AIT as described in the European, firstly, in the high incidence (75%) of bullae within the mouth and, secondly, in the shorter duration of the illness. However, in the drug-induced form of AIT in the European a comparable frequency of oral lesions has been reported. The disease tends to be more common in the first decade in the Bantu than in the European. In its relatively benign

course, as well as in the changes which occur in the blood and bone marrow, there is no difference to be observed in the disease as it is manifested in the Bantu and in the European.

The authors are unable to suggest the aetiology of onyalai. They consider but reject the possible role of malnutrition; they can find no evidence to suggest that European drugs unofficially purchased play a causative part, and do not agree with the view that native herbal medicines or the decoctions of witch-doctors are of importance. Nor is the disease strictly confined to the tropics, for examples have been reported from Cape Town.

[From this study it seems probable that onyalai is a manifestation of the same morbid process which causes AIT in the European, with slight variation in its clinical features due to racial differences.] *J. H. Walters*

HEZEBICKS, M. M. & NIGG, Clara. **Chemotherapy of Experimental Melioidosis in Mice.** *Antibiotics & Chemotherapy.* New York. 1958, Nov., v. 8, No. 11, 543–60. [32 refs.]

This paper describes an extensive and evidently carefully conducted trial of various drugs in the treatment of experimental melioidosis in mice. These were inoculated with mouse-adapted strains of *Malleomyces pseudomallei* [*Pfeifferella whitmori*] either intraperitoneally or by inhalation: infection produced by the latter method responded less well to treatment. Other variables were the inoculum (from under 50 to over 1,000 LD50), the dose and route of administration of the drug, the duration of treatment, and the strain of organism used. A series of experiments is described on page after page in which these factors were varied, and the results were also variable enough to leave the relative efficacies of the drugs in some doubt. The effects were judged by survival for 1 month (suppression of the infection) and negative cultures at autopsy (cure).

When treatment was limited to 5 days, only chloramphenicol achieved a high proportion (70–80%) of cures, next in efficacy being sulphonamides (sulphadiazine, triple sulphonamide and sulphisoxazole were tried, with or without excipients: the last named was the least effective). When treatment was extended to 15 days, chloramphenicol, sulphonamides and chlortetracycline given subcutaneously (the oral route was less effective) all produced 70% or more cures. Oxytetracycline was less effective than chlortetracycline: novobiocin had moderate activity, and nitrofurantoin and neomycin none. These findings apply to mice inoculated intraperitoneally, and to the strain of organism principally used. Since no drug produced 100% cures under all conditions, the authors are now studying combined therapy. *L. P. Garrod*

LEVINE, H. B. & MAURER, R. L. **Immunization with an Induced Avirulent Auxotrophic Mutant of** *Pseudomonas pseudomallei.* *J. Immunology.* 1958, Nov., v. 81, No. 5, 433–8, 4 figs. [26 refs.]

## PARASITOLOGY: GENERAL

LAPAGE, G. **Parasitic Animals.**

This book was reviewed on p. 497.

POLISH PARASITOL. SOC. Materiały na VI zjazd Polskiego Towarzystwa Parazytologicznego, Lublin, 19–22.10.1958. [**VI Congress of the Polish Parasitological Society, Lublin, 19th–22nd Oct., 1958**] *Wiadomości Parazytologiczne*. Warsaw. 1958, v. 4, Nos. 5/6, 367–809. English summaries.

This Congress volume consists of abstracts of the papers presented to the meeting, and these are printed in both Polish and English. The volume is divided into various sections: —

Anthropozoonoses (trichinellosis and toxoplasmosis) (pp. 367–430). This deals with experimental work and clinical observations on both diseases; abstracts of 23 papers are published.

Pasture parasitic diseases of domestic animals (pp. 431–491). 19 abstracts are included.

Medical parasitology (pp. 493–572). In this section there are 29 abstracts, on intestinal parasites in general, various nematodes and trichomonads.

Veterinary parasitology (pp. 573–612) with 12 abstracts.

General parasitology (pp. 613–725) with 42 abstracts relating to parasites of animals and birds.

Arachnoentomology (pp. 727–794) with 21 abstracts, some of which relate to *Anopheles, Aëdes* and other mosquitoes.

The abstracts do not give much detail but are convenient summaries of the work being done by Polish scientists. *Charles Wilcocks*

CARLI, G. & CASAROSA, A. Indagine sull'incidenza delle parassitosi intestinali tra gli abitanti di alcune zone agricole del comune di Cascina (Pisa). Considerazioni su alcuni metodi pratici di lotta. [**The Incidence of Intestinal Parasites among the Inhabitants of a Rural Part of Cascina (Pisa) Municipality**] *Igiene e San. Pubblica*. Rome. 1958, Sept.–Oct., v. 14, Nos. 9/10, 475–86. [11 refs.] English summary (9 lines).

The commune lies in the lower Arno valley and though the main industry is agriculture there is also a brickworks and a woodworking trade. The economic level of the inhabitants is moderately good but, as in a number of similar reports, the hygiene conditions are poor.

The population of the commune numbered 3,705 all told and samples of faeces from 209 males and 221 females, both adults and schoolchildren, were examined after concentration, while the scotch-tape method was used for *Enterobius* in the children.

131 males (62·3%) and 127 females (57·4%) were found to harbour parasites or commensals. Among protozoa, *Entamoeba histolytica* was found in 2 males and 1 female, and *Giardia* in no less than 47 males and 50 females. As regards helminths, *Ancylostoma duodenale* was found in 2 males and 2 females. This is the first time this infection has been found in this area. *Ascaris* was present in 8 males and 1 female. Of the 62 boys and 55 girls examined *Giardia*

was found in 23 of the former and 22 of the latter, *Ascaris* in 6 boys and 1 girl, and *Enterobius* in 27 boys and 25 girls.

The authors draw attention to the necessity for proper arrangements for disposal of faeces and the need for education. *W. K. Dunscombe*

JIROVEC, O. **Achievements and Perspectives of Human Parasitology in Czechoslovakia.** *Bull. Calcutta School Trop. Med.* 1958, Apr., v. 6, No. 2, 75–9.

The achievement of Czechoslovakian parasitologists of the past are briefly listed (LAMBL, PROWAZEK, JANKU, LUKES and DRBOHLAV), and then an account is given of infections found today in that country. *Trichomonas vaginalis* affects about 10% of the population (women) and an unknown number of men as latent carriers; the intradermal test indicated that 15–30% of the population had *Toxoplasma* (which is held to be responsible for mongolism); *Pneumocystis* causes a hundred deaths a year in infants; many strains of *Leptospira* have been recognized (including several in swine); a quarter of a million people are infected with *Giardia* (though there is a low incidence of *Entamoeba histolytica*); enterobiasis is very common and widespread and is cured in most patients with a combination of fuchsin, phenothiazine and hexylresorcinol and still better results have been obtained with piperazine; 20% or more of the population of Slovakia has *Ascaris*; *Trichinella* is found in foxes (20–30%), lynxes (60%), wild cats (15%), wolves (33%) and rats (0·3%), as well as in man. The zoonotic aspect of these diseases is discussed and particular reference is made to tick encephalitis, tularaemia and Q fever. *P. C. C. Garnham*

KUNTZ, R. E., LAWLESS, D. K., LANGBEHN, H. R. & MALAKATIS, G. M. **Intestinal Protozoa and Helminths in the Peoples of Egypt living in Different Type Localities.** *Amer. J. Trop. Med. & Hyg.* 1958, Nov., v. 7, No. 6, 630–39, 1 map. [18 refs.]

Numerous surveys have been made of protozoal and helminthic disease in Egypt [see this *Bulletin,* 1954, v. 51, 643; 1957, v. 54, 624; 1959, v. 56, 232]. The present survey reports on the examination of stools from 1,408 persons in 13 widely separated localities, namely a coastal fishing village, 5 farming communities in 4 provinces, 3 urban communities, 2 communities intermediate between farming zone and desert, and 2 desert communities. Each specimen was examined by direct smear and after concentration. 10 species of protozoa and the eggs or larvae of 19 species of helminths were found.

It is shown that the relationship between type of locality and infection with protozoa was different from that between type of locality and infection with helminths. Transmission of protozoal infections conveyed by contaminated hands or food will be unaffected by the aridity of the environment in which many Egyptians live. Helminth parasites in many cases require intermediate hosts and this limits their spread more than that of protozoa. Most of the people examined harboured some type of intestinal fauna but many were fairly free of helminths.

A table shows the various species found and their prevalence in the communities studied. *Entamoeba histolytica* incidence is given for both small and large races, and their total incidence in this survey is much higher (ranging

from 2 to 21%) than in other parts of the world. *Balantidium coli* was not found and *Isospora hominis* was noted twice only. Among the helminths the presence was noted of *Opisthorchis, Haplorchis, Dicrocoelium, Fasciola* and *Diphyllobothrium*. *Ascaris* was the most common helminth except among Bedouins. *Heterophyes* parasites were noted in 7 localities and at El Burg near Lake Burullus some 99% of nearly 4,000 snails (*Pirenella conica*) produced heterophyid type cercariae of several species. Mullet are salted there in large numbers and are consumed by people far distant before the metacercariae have died.

*T. H. Davey*

PECCHIAI, L. Sulle forme di polmonite interstiziale del lattante cosiddette " in via di guarigione " o " abortive ". [**So-Called " Abortive " or " in Course of Cure " Forms of Infantile Interstitial Pneumonia**] *Giorn. di Malattie Infettive e Parassit.* 1958, Sept., v. 10, No. 9, 758–62, 4 figs.

At the present time a good deal of attention is being given to this condition, and this and the following abstract [see below] from papers from the Pathological Institute of Milan University suggest a re-thinking on its aetiology.

The author points out that often in atypical cases of plasma-celled interstitial pneumonia the cystic form of *Pneumocystis carinii* is scarce or even absent and he puts forward 2 hypotheses: (a) that the condition is due to a virus and *Pneumocystis* has nothing to do with it; (b) that it may be due to *P. carinii* but in a special evolutive cycle with an intracellular form, the " typical " cystic form being scarce or absent.

He has studied 10 cases, and histological specimens from some of them are shown. 6 which were analogous to those regarded by HAMPERL (*Virchows Archiv.*, 1957, v. 330, 325) as " abortive " or " in course of being cured " showed a histiocytic cellular reaction in the alveolar septa, the cells containing numerous PAS-positive granules, while the cystic form of *Pneumocystis* was absent. These granule-containing cells are absent from the florid form of the disease.

Discussing pathogenesis, Pecchiai points out that the epidemic form has almost entirely disappeared and only sporadic cases are seen now. In such cases he suggests that the infection arises *in utero,* the infection being transmitted through the placenta, which would explain the atypical anatomo-clinical reaction and almost silent course, while the " typical " forms probably arise in babies born healthy who become infected by inhaling the organism.

*W. K. Dunscombe*

PECCHIAI, L. Reperti di parassitismo extrapolmonare in corso di polmonite interstiziale dell'infanzia. [**Extrapulmonary Parasites in Infantile Interstitial Pneumonia**] *Giorn. di Malattie Infettive e Parassit.* 1958, Sept., v. 10, No. 9, 762–5, 4 figs. [10 refs.]

In this second paper the author gives a histological picture of the extrapulmonary forms of a parasite found in cases of plasma-celled interstitial pneumonia.

He mentions that " *Pneumocystis* " has been found in the blood-vessels, liver, kidney, spleen, and brain, but considers that the cystic form develops only in the lungs, and that the PAS-positive granule form is the extra-pulmonary manifestation.

Basing his remarks on 6 typical and 6 atypical cases he states that the extra-pulmonary forms can be differentiated into 2 principal groups: (a) those developing in the epithelial glands, *e.g.*, salivary, gastric, and intestinal, the renal tubules and the mucus-producing glands of the bronchi; and (b) those developing in the cells of the reticulo-endothelial system and intestine. He suggests that infected mucus from the bronchi is responsible for aerial diffusion while the infection can also be transmitted through the gastro-intestinal tract. The extra-pulmonary presence of the organism is an expression of the elimination of the parasite and the infection should be regarded as a generalized disease, the true infective forms being the granular, the cystic forms being typical of extracellular development only. *W. K. Dunscombe*

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## ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

La Rocca, V. Principali insetti, animali e piante d'importanza igienica in Italia. [**Principal Insects, Animals and Plants of Medical Importance in Italy**] *Nuovi Ann. d'Igiene e Microbiol.* 1958, Sept.–Oct., v. 9, No. 5, 393–405. [12 refs.] English summary (3 lines).

See also p. 510, Service, **Mosquito Survey of some Areas in the Southern Cameroons under United Kingdom Administration.**

Laarman, J. J. **Research on the Ecology of Culicine Mosquitoes in a Forest Region of the Belgian Congo.** *Acta Leidensia* (*Scholae Med. Tropicae*). 1958, v. 28, 94–8.

Observations on mosquitoes inhabiting forest traversed by steep ridges, around Irangi, and also in forest 200 km. to the west of the Semliki plain, are compared with observations in Bwamba, Uganda [this *Bulletin,* 1947, v. 44, 516; 1949, v. 46, 172]. The main forest canopy is at a height of 30–40 metres with an understorey at about 12 metres. There is no marked dry season and the rainfall is about 3 metres a year.

*Anopheles gambiae* is apparently very rare and, although malaria in children showed an index of up to 10%, it is believed that most infections are contracted when travelling elsewhere. Larvae were found very occasionally in puddles in the road, sunlit for a few hours, and adults were found in one village near the road. The commonest species of *Anopheles* were *A. vinckei* and *A. cinctus*. An isolated population of *A. gambiae* was found in the Luhoho valley, where the valley is wide and extensively cultivated. Here the *Plasmodium* index in children was from 70 to 80%.

Information about culicine mosquitoes was obtained by fixing about 120 bamboo sections at different heights on trees. These artificial breeding places were kept under observation twice a week for 18 months. About 80% of the

bamboo pots were found to contain larvae. This is interpreted as indicating a lack of natural breeding places in the area. Most natural tree holes were found to contain water for only a limited period, but some species, such as *Toxorhynchites brevipalpis* and *Culex albiventris,* preferred the natural breeding sites to the bamboo containers.

The artificial containers provided evidence of the vertical stratification of mosquitoes in the forest. *Aëdes apicoargenteus* showed a marked preference for the highest level, up to 25 metres, but *Aëdes africanus* preferred the lower levels, although this preference was not so marked as in species of the *chrysogaster* group of *Eretmapodites.* The bamboo containers also recorded the distribution of mosquitoes horizontally through the forest. *Aëdes apicoargenteus* was shown to prefer clearings, whereas *Aëdes africanus, Aëdes longipalpis* and *Aëdes simulans* were found principally in dense forest. Some species of *Culex* were found only under pure stands of *Gilbertiodendron.* Although the bamboo sections were inhabited by mosquito larvae throughout the period of the investigation, and although there is no marked dry season in this area, the relative densities of the species were found to fluctuate over the months.

Adult mosquitoes were also trapped coming to bite under mosquito netting. *Aëdes simpsoni* was shown to prefer man to monkey, and this species was found to breed abundantly in banana leaf axils but not in the axils of *Pandanus,* although both plants were available in the same area. Near Stanleyville, *Aëdes simpsoni* has been shown to be non-man biting and to breed in *Pandanus* leaf axils.

This paper was given between 6th and 11th May 1957 to a meeting on the cartography of the vectors of disease at Bukavu. [One would like to see these observations published in a less abbreviated form.] *B. R. Laurence*

LAVOIPIERRE, M. M. J. **Presence of a Factor inhibiting biting in** *Aedes aegypti.* *Nature.* 1958, Dec. 6, v. 182, 1567–8, 2 figs.

In a previous paper [this *Bulletin,* 1958, v. 55, 1284] the author has suggested that in one race of *Aëdes aegypti,* in the mated females, the ovulation hormone [*ibid.,* 1957, v. 54, 627] might be responsible for the inhibition of biting after a blood meal. Further experiments with the same strain of mosquito have shown that if unmated females with fifth stage oöcytes, which showed no inhibition of biting, were mated, then biting was inhibited completely after 2 hours. This inhibition lasted for 4 to 5 hours after mating but biting was resumed despite the females being fertilized. Egg laying followed about 2 days after mating. It is suggested that the " biting-inhibitory factor " is distinct from the ovulation hormone, but that in the normal oviposition cycle the two factors operate in harmony. *B. R. Laurence*

CAPONE BRAGA, P. Sulla presenza di *Aëdes mariae* nella provincia di Latina. [**On the Presence of** *Aëdes mariae* **in the Province of Latina**] *Rendiconti Istituto Superiore di Sanità.* Rome. 1958, v. 21, Pt. 10, 957–67, 5 figs. & 1 coloured pl. [10 refs.] English summary.

BECKER, P. **The Behaviour of Larvae of *Culicoides circumscriptus* Kieff. (Dipt., Ceratopogonidae) towards Light Stimuli as influenced by feeding, with Observations on the Feeding Habits.** *Bull. Entom. Res.* 1958, Dec., v. 49, Pt. 4, 785–802, 9 figs. [22 refs.]

Although the larvae of *Culicoides circumscriptus* live in the mud of salt marshes in Britain, they can be maintained in fresh water in the laboratory. The detailed nature of the food has not been determined, but the larvae are selective detritus feeders, taking in vegetable matter and bacteria, and they are also facultative carnivores. Green algae do not appear to be an important part of their diet. Larvae extracted from mud and placed in tap water are photonegative. If the larvae are starved, after about 8 days almost all are photopositive. If the starved larvae are fed on blowfly larvae, or if they are kept in a culture medium, most of the larvae become photonegative. It is suggested that the function of these differential reactions between starved and fed larvae is to maintain the larvae at the surface of the mud while feeding, and to drive them below the surface when they have fed. Some experiments of placing larvae in different culture media suggested that the larvae feed on material both at and below the surface of the mud. Larvae that have not fed below the surface, in "incomplete" culture media, remain photopositive or react as starved larvae, despite the intake of food at the surface.

*B. R. Laurence*

GILLIES, M. T. *Simulium* **in Southern Arabia.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1958, Sept., v. 52, No. 5, 475.

The author refers to FAWDRY's description of cases of onchocerciasis thought to have been acquired in the Yemen [this *Bulletin*, 1957, v. 54, 1114] and records the finding of *Simulium* in 2 localities in the Western Aden Protectorate. This is believed to be the first record of *Simulium* from the Arabian peninsula.

Gillies made a brief survey of insects of medical importance in the area concerned in late 1957 and found pupae of *Simulium ruficorne* in small numbers in a mountain stream at Mukheiras on the Yemen border (6,000–7,000 feet). There are several streams plunging through deep gorges down a massive escarpment to the elevated plains round Lodar. Their descent provides favourable conditions for running water insects. Larvae and pupae of *S. ruficorne* were also found quite commonly in permanent trickles in the narrow tributary valleys of the Wadi Yeshbum near Sa'id (3,500–4,000 feet). In neither locality were adult flies found. *Simulium* was not found in permanent streams in the Wadi an Nahr near Beihan (4,500 feet) nor in torrents and rapid aqueducts at low altitudes at Khorbe in the Hadhramaut.

The distribution of *S. ruficorne* is exceptionally wide: it occurs over a large part of Africa including Algeria and Somaliland, in a number of islands in the Indian Ocean and in Java. The species is not known to attack man.

*H. J. O'D. Burke-Gaffney*

WOLFE, L. S. & PETERSON, D. G. **A New Method to estimate Levels of Infestations of Black-Fly Larvae (Diptera: Simuliidae).** *Canadian J. Zool.* 1958, Dec., v. 36, No. 6, 863–7, 3 figs.

Various methods for standardizing samples of *Simulium* larvae in Canadian rivers, and their limitations, are reviewed. Good results were obtained and

with practical convenience by suspending hollow, white, galvanized metal cones —20 cm. long and 10 cm. in diameter with an apex angle of 30°—in rivers by fixing them to natural objects, stones, etc., with a wire one metre long. The apex pointed up-stream. A table shows counts per cone of up to 2,158 larvae, the area of a cone being 300 sq. cm. Two graphs illustrate different seasonal densities of larvae in two streams with different characteristics near Quebec.

Other papers are in preparation in which this sampling method is applied to biological studies and to assessment of control. *D. S. Bertram*

HADJINICOLAOU, J. **Present Status of *Phlebotomus* in certain Areas of Greece.** *Bull. World Health Organization.* Geneva. 1958, v. 19, No. 6, 967–79, 1 fig.

Intensive residual spraying indoors against anopheline mosquitoes was begun in many parts of Greece and in Crete in 1946. The effects of this on *Phlebotomus* were examined in surveys during the summer of 1957. Unpublished records of surveys in 1939 and 1940 by the author had included 8 species of *Phlebotomus*: *P. papatasi* predominated in most places, including Athens. Other species were *sergenti, chinensis, major, macedonicus* (*perfiliewi*), *tobbi, parroti* and *minutus*. In 1957, Athens and various villages on the mainland, places in Peloponnesus, and various islands including Crete, were investigated by collecting adults from houses; stables and other outbuildings were also searched in the rural areas. *P. papatasi* was fairly frequently taken in Athens and other towns, and in villages which had been only partially sprayed or not included in antimalarial control. Where there was a reliable history of intensive sprayings sandflies were few or absent. Even in Crete where spraying, other than as a personal domestic convenience by individual people, ceased in 1951 over 20 villages examined in 1957 were negative; up to 4 sandflies were found in four villages. Large towns of Crete, not included in antimalarial sprayings, were more productive, particularly of *P. papatasi,* as many as 37 out of 62 houses yielding some flies.

The standard WHO kit for testing the susceptibility of mosquitoes was used, slightly modified (illustrated), to obtain the following LD50 levels for *P. papatasi*: DDT—0·28% and 0·75% at Athens and a town in Crete respectively, and dieldrin—0·2%. *D. S. Bertram*

HAFEZ, M. & ATTIA, M. A. **Rearing and Culturing *Musca sorbens* Wied. in the Laboratory.** *Bull. Entom. Res.* 1958, Dec., v. 49, Pt. 4, 633–5.

The preference of *Musca sorbens* for human faeces as a breeding medium makes it difficult and unpleasant to rear in the laboratory. In testing several artificial media for laboratory rearing of the species the authors found the following method satisfactory: flies were induced to oviposit on cotton-wool soaked in a 2:1 milk-water mixture, sugar and water also being provided, or on 10–15 gm. of human faeces in a Petri dish, more eggs being laid on the latter. The eggs were transferred to a 1:2 (w/w) mixture of coarse wheat bran and diluted milk in a jam jar. The jar was covered in muslin and kept at 27–28°C. Pupation occurred on about the fourth day in sand added to the top of the medium. Puparia were sorted by flotation on the fifth to sixth day.

30 gm. of the above mixture produced up to 260 full-grown larvae, giving puparia slightly less in weight than those reared on faeces, but the resulting adults were quite healthy. *E. R. Nye*

DUBINSKAIA, G. I. **Use of Thiodiphenylamine (Phenthiazine) and Kerosene to control Fly Larvae in 1955–56.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, Nos. 7/8, 1155–57. [Translated from Russian.]

In order to find an efficient and cheap method of controlling house-fly larvae in latrines, the effects of kerosene and thiodiphenylamine (phenothiazine, $C_6H_4SNHC_6H_4$) have been studied. The best results were obtained with 500 gm. of kerosene or 100–150 gm. of thiodiphenylamine twice a month. Variations in time of reinfestation by fly larvae after treatment depended on several factors including the temperature, and the depth and the illumination of the latrine.

Both compounds possessed the advantage of low costs in both labour and material but kerosene could be used only where there was no fire danger. No expensive apparatus was required. Kerosene could be effectively applied with a watering can and thiodiphenylamine with a dust pulverizer. Two applications only per month were required as compared with 13 for BHC and other recommended compounds. Thiodiphenylamine was applied especially to places such as public lavatories where it was dangerous to use kerosene. *R. J. Wood*

BETTINI, S., BOCCACCI, M. & NATALIZI, G. **A Comparative Study on the Speed of Action of some Halogen-Containing Thiol Alkylating Agents on Resistant House Flies.** *J. Econom. Entom.* 1958, Dec., v. 51, No. 6, 880–82, 4 figs.

See this *Bulletin,* 1957, v. 54, 1022.

MENON, P. B., KARANI, N. D. P. & NARASIMHAN, D. **Control of Bedbugs and the Problem of Resistance.** *Indian J. Pub. Health.* 1958, Oct., v. 2, No. 4, 265–71, 325. [19 refs.]

In Poona Cantonment, residual spraying with DDT of barracks and houses has been done regularly for the past 12 years. Infestations with *Cimex hemipterus* are still to be found. Tests were made to determine the susceptibility of the bug to DDT, BHC and Diazinon. Adult bugs were used. In some tests they were in contact with DDT or BHC as a dust with talcum powder in serial proportions for fixed periods of time. Earlier records [this *Bulletin,* 1957, v. 54, 99] of a test of bugs against DDT provide comparative data informative on developed resistance. In 1956, 50% kill of bugs from an untreated area was obtained 24 hours after an 8–10 minute exposure to 5% DDT in talcum. Bugs in the present samplings from Poona Cantonment required 5–6 hours' exposure to give a 50% kill. There are no earlier laboratory data for BHC susceptibility, but present tests give an LD50 value of 0·41% for BHC-talcum dust. It is thought from this, together with general evidence of bugs in BHC-treated buildings, that this insecticide also is not so effective now as formerly. (It had been brought into use in premises where DDT had become ineffective.)

Some laboratory tests, and also field trials in which barracks were sprayed with Diazinon and with BHC at 20 mgm. per sq. ft. and DDT at 100 mgm.

per sq. ft., indicated that Diazinon was most effective, BHC reasonably effective, and DDT least so. Figures for the decline in bug densities, expressed as bugs per man-hour, after treatment of barracks were: DDT (9 to 8·5 bugs), BHC (8·2 to 7 bugs), Diazinon (9·8 to 1·2 bugs). Mortalities in bugs collected in the barracks and kept for 24 hours were: DDT (12·3%), BHC (55·3%), Diazinon (90·9%). It was difficult to find live bugs in the Diazinon-treated barrack. [It seems that observations were continued for some weeks but details are not given.] A single application of Diazinon is recommended for eradicating the DDT- or BHC-resistant bugs. *D. S. Bertram*

HUDSON, B. W. & PRINCE, F. M. **A Method for Large-Scale Rearing of the Cat Flea,** *Ctenocephalides felis felis* **(Bouché).** *Bull. World Health Organization.* Geneva. 1958, v. 19, No. 6, 1126–9, 3 figs.

Domestic cats were housed continuously in special cages in which the cat flea, *Ctenocephalides felis felis,* was cultured in mass for investigations on flea-bite allergy. The weekly requirement to prepare antigen was 250,000 to 500,000 fleas. The method is described in detail, with illustrations of the cage. The flea larval medium was sawdust, dog-food, brewer's yeast and dried beef blood. This, with larvae, pupae and adult flies, was removed weekly by being allowed to run into a large glass jar fitted to an opening in the bottom of the cat cage. It was then stored and examined for further pupae at intervals. A culture started with 100 female and 25 male fleas produced nearly 3,000 pupae at its peak with substantial numbers before and after this maximum yield. Cats urinated and defaecated fairly consistently in special sawdust trays, but when dogs were used they were found to foul the larval medium so much that this had to be withdrawn every 2–3 days. The original paper should be consulted for details of the technique. *D. S. Bertram*

HUDSON, B. W. & PRINCE, F. M. **Culture Methods for the Fleas** *Pulex irritans* **(L.) and** *Pulex simulans* **Baker.** *Bull. World Health Organization.* Geneva. 1959, v. 19, No. 6, 1129–33, 1 fig.

*Pulex irritans* and the closely related species, *P. simulans,* have not proved easy to culture in the past. Several methods are reported in this note. *P. irritans* fed through gauze tops of pill-boxes on hosts (man, guineapig or dog) or on citrated blood of man or dog through an animal membrane were most productive when the blood was human (6·4 to 10·3 pupae per female flea per week). These methods were not effective for *P. simulans.* Mass production on guineapigs in porcelain pots was moderately successful but only for *P. irritans.*

The technique used for *Ctenocephalides felis felis* [see above] was also tried for each species of *Pulex* and different hosts. The jumping power of *P. irritans* —a strain from a human dwelling—rendered this method difficult if escapes were to be prevented. *P. simulans* was more suitable to the method, being a less efficient jumper and tending to stay longer on the host. (This also applied to a strain of *P. irritans* originating from a foxes' den.)

*P. simulans* bred successfully on Californian grey fox, and *P. irritans* (fox strain) on dog and cat, particularly the dog host. Pupal yields were from 10 to 20 pupae per female flea per week. Results are tabulated, and the small pill-box containers illustrated. *D. S. Bertram*

WIGGLESWORTH, V. B. **The Distribution of Esterase in the Nervous System and other Tissues of the Insect** *Rhodnius prolixus*. *Quart. J. Microscop. Sci.* 1958, Dec., v. 99, Pt. 4, 441–50, 2 figs. (1 on pl.) [34 refs.]

HOCKING, B. & LINDSAY, I. S. **Reactions of Insects to the Olfactory Stimuli from the Components of an Insecticidal Spray.** *Bull. Entom. Res.* 1958, Dec., v. 49, Pt. 4, 675–83, 4 figs. [14 refs.]

The repellent action of spray ingredients was investigated by the authors, each of whom used different techniques and worked in different laboratories. Two kinds of equipment, one of them new, were used for measuring the reactions and are fully described. The ingredients tested were technical DDT, diesel fuel oil and a proprietary solvent Velsicol AR50 (consisting mainly of methylated naphthalenes). The species investigated included *Drosophila melanogaster*; *Aëdes aegypti*; two strains of *Musca domestica,* one of which was resistant to DDT; a Chloropid fly, *Thaumatomyia glabra*; wild caught *Aëdes* spp. and *Culex tarsalis*. All the substances tested were strongly repellent, or contained repellent components, to all the species tested, although the DDT-resistant *M. domestica* strain was less sensitive than the susceptible strain.

One of the conclusions from these findings was to emphasize the advisability of moving upwind at each spraying sweep so that insects driven out of the sprayed areas would be continually meeting successively treated zones. A suggestion is also made that selective survival of insects showing these reactions may have to do with the emergence of behavioural resistance. *E. R. Nye*

IAZIKOV, D. F., RUNDKVIST, V. A. & RAIGORODSKAIA, V. I. **Experimental Production and Use of Insecticidal Lacquers and Paints.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, Nos. 7/8, 1135–43. [Translated from Russian.]

There are many disadvantages attending the use of powdered and emulsified DDT for the disinfestation of ships, among the most important being their weak effect on cockroaches. A combination of 90% Flitcide [pyrethrum extract ?], 8·5% DDT (100%) and 1·5% BHC (100%) gives better results but the duration of action of this medium is still reckoned only in weeks and necessitates the repeated treatment of a ship several times during a single voyage.

More effective and lasting results have been obtained with insecticidal paints which the authors have extensively studied under laboratory and natural conditions. An oil paint containing 1·5% BHC gave a lasting effect against cockroaches of all ages and, moreover, it stood up to all the requirements of a standard white oil paint, *e.g.*, as far as rate of drying, water resistance and colour were concerned. A single coat kept a ship free from cockroaches for a complete voyage and had no ill effects on persons in frequent contact with it.

The insecticidal properties of DDT paints depend on the formulation used: 10% crystalline DDT gave good results while DDT wax in any proportion was unsatisfactory. *R. J. Wood*

## MISCELLANEOUS PAPERS

ANDREWS, W. H. H., HECKER, R. & MAEGRAITH, B. G. **Observations on the Innervation of the Hepatic Blood-Vessels.** *Ann. Trop. Med. & Parasit.* 1958, Dec., v. 52, No. 4, 500–507, 7 figs.

LUYKEN, R., VAN DAM-BAKKER, A. W. I. & DE GROOT, A. P. **Observations on Serum Proteins of Inhabitants of New Guinea and the Antilles, compared with Animal Experiments.** *Trop. & Geograph. Med.* Amsterdam. 1958, Dec., v. 10, No. 4, 385–91. [Numerous refs.]

This is an English version of a paper read at the International Symposium on Nutrition, Brussels, May 16–18, 1958. See above, p. 556.

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## REPORTS AND SURVEYS

WEST AFRICAN COUNCIL FOR MEDICAL RESEARCH. **Annual Report, 1957.** 192 mimeographed pp., numerous figs. [1958.] Lagos: Private Mail Bag 2582, Nigeria.

This cyclostyled report is a lengthy document covering a wide range of subjects. It is impossible in a brief review to do more than indicate some of the more important and interesting problems studied.

An investigation on child health, supported by a grant from the Council, is being carried on in the Wesley Guild Hospital, Ilesha, West Nigeria, and a nearby village. The prevalence of the common diseases of children is being investigated and the relationship between low birth weights and subsequent history. Interesting observations were made on breast feeding customs in the villages and on the rate of growth of infants there.

The Helminthiasis Research Unit has reported on *Chrysops* longevity, food requirements, biting densities and on dispersal and flight range based on the release and recapture of 10,000 marked flies. Investigations are being made on *Chrysops* oviposition habits and larval habitats. A key to the larvae has been constructed and is being tested. The human and simian forms of *Loa loa* have been hybridized.

The Virus Research Unit has been largely concerned with the study of adult mosquito catches with special reference to yellow fever vectors and the epidemiology of the disease. Studies have been made on adult mosquitoes marked by radio-active isotopes which had been added to the water in the breeding place. An epidemic of influenza in Kano was studied. On isolation the virus proved to be Influenza A/Asia 1957; it was probably introduced by pilgrims returning from Saudi Arabia. Infection rates with poliomyelitis have been studied in sera from Northern Nigeria; 100% incidence with types I and III was reached at 4 to 5 years of age and with type II at 10 to 14 years. This high incidence makes it difficult to explain the occasional adult African infection and raises the question of whether it is due to poliovirus and if so whether the virus is a

different type. Other viruses have been detected or have been isolated and studied; Coxsackie from a European in Nigeria, and antibodies to Coxsackie B4 in a European in Sierra Leone. A virus from Ilesha children has been isolated in baby mice and it infected *Aëdes aegypti* by feeding and by injection. Studies are being made by the examination of repeated biopsy specimens on the cytology and cytochemistry of liver cells in Indian monkeys infected with yellow fever. The sequence of changes during infection are described [see this *Bulletin*, 1958, v. 55, 392]. A virus and an acid-fast organism have been isolated from locally malignant subcutaneous tumours which have occurred as an outbreak in a Rhesus colony.

The Tuberculosis Research Unit has been mainly concerned with clinical work. Arrangements have been made for an inter-territorial study in British West Africa of treatment without bed rest, and several treatment regimes are being compared. An entomological survey of malaria in Freetown was made and recommendations made for methods of providing a better assessment of the malaria situation and for improving control techniques.

The concluding pages are concerned with administration and a financial statement. It is interesting to note that the Council, in addition to conducting research, is now fostering it by means of grants to workers not in the employ of the Council.

[A short printed Annual Report for 1957–58 has also been published by the Council and may be obtained from their Administrative Headquarters, Yaba, Lagos, Nigeria.] *T. H. Davey*

GARDNER, R. F. R. & GARDNER, Elizabeth S. **Infant Mortality in Northern Nigeria, with especial reference to the Birom Tribe.** Reprinted from *J. Obstet. & Gynaecol. Brit. Empire.* 1958, Oct., v. 65, No. 5, 749–58, 3 figs. [44 refs.]

The literature concerning infant mortality in tropical Africa is reviewed at the beginning of this paper and it reveals an astonishing degree of variation from 78·1 to 627 per 1,000 live births. The literature from Northern Nigeria also reveals a variation from 202 to 634 or even as high as 825 in a selected population. This paper gives the results of a study of infant mortality among the Birom living on the Bauchi Plateau of Nigeria. It is believed that it presents a reasonably accurate picture because the figures are provided by long established mission clinics which are readily attended by all sections of the community.

At the antenatal clinic the previous pregnancies of 1,383 women were recorded; they had given birth to 4,306 children of whom at the time of attendance at the clinic 2,114 had died, a mortality of 490·9 per 1,000 live births. In another section of the tribe 580 women reported 957 deaths out of 1,955 live births. Study of 551 children in these two series combined showed that 40% of deaths occurred in the first month, 74% under the age of one year, and 91% under the age of 2 years. The neonatal mortality rate was thus 195/1,000 live births and the infant mortality rate 358. A study of mortality in relation to birth rank showed that in families of 1 to 6 children the expectancy of survival for each child was more favourable than for its older sibling. Uncomplicated respiratory infections were the commonest cause of death followed by dysentery and malaria. Multiple infections were common, there being 1,304 diagnoses in 834 patients. The average weight at birth was 6 lb.

¼ oz., and the sex ratio at birth was 108 males to 100 females. Some additional interesting observations are made. Birom children are spaced by stopping coitus until the child can walk by itself. Severe anaemias and gross kwashiorkor are uncommon, the local staple food, *Digitaria exilis,* being rich in protein. Over the last 15 years infant mortality has dropped from 690 to 370/1,000, largely as a result of better hygiene consequent on improved economic and educational status.

*T. H. Davey*

FOLL, C. V. & KHIN, O. **Perinatal Problems in Upper Burma.** *J. Trop. Med. & Hyg.* 1958, Dec., v. 61, No. 12, 304–10. [36 refs.]

The authors discuss the health of Burmese women during and immediately after pregnancy. Their experience is drawn from the families of the labour force of a large oil field situated in the dry zone of Upper Burma. The material is thus somewhat selected, since the population is housed under sanitary conditions and is relatively prosperous.

The Burmese women tend to reduce their food intake during pregnancy in order to avoid having a large baby. Their staple cereal is rice, with vegetables, occasionally meat and some fish. Of the pregnant women, 18% were in the 15–20-year age-group, 62% 20–30 years and 18·4% were over the age of 35 years. The mean fecundity was 4·7 children per woman. Primiparae represented 13% of the antenatal attendance, 50% were at the 5th pregnancy or more and 12% at the 9th or more.

Despite the fact that the iron intake was probably of the order of 8–9 mgm. per day, the haemoglobin levels of both girls and pregnant women were fairly good. Only 11% had a haemoglobin concentration of less than 60% ; 19·8% showed 60–70% haemoglobin, the remainder being above this figure. All patients responded to oral iron therapy and in no case was macrocytosis demonstrated. The average haemoglobin levels of girls of 15–17 years was lower than that of older women, which conforms to general experience. The neonatal haemoglobin concentrations, which averaged 128% (19·0 gm.) at birth were significantly lower than in European children, and this was related to the subnormal mean haemoglobin concentration, 80% (11·8 gm.), of the mothers at the time of parturition.

Pregnancy was deemed inadvisable under local conditions in women who were found to be suffering from pulmonary tuberculosis, and it was terminated. Similarly, since there was no possibility of removing the new-born child from any mother who was suffering from lepromatous leprosy, in such cases also the pregnancy was brought to an end.

Syphilis was prevalent, the incidence being 13·7% according to results of the Kahn test. Intestinal parasitization was also common, 46·7% of the women carrying *Entamoeba histolytica,* 10% *Giardia intestinalis* and 8% *Ascaris lumbricoides.* Ankylostomiasis was found to be uncommon.

Abortions occurred in only 8 women (2·2%), of whom 1 was syphilitic. It was only rarely necessary to admit women to hospital in the antenatal period, admission being necessitated by anaemia, threatened abortion, antepartum haemorrhage, influenza, pre-eclampia, hyperemesis and digestive disorders.

Among 244 deliveries, on 5 occasions only were forceps used—for uterine inertia (3), eclampsia and occipito-posterior presentation. Caesarian section was performed on 4 women, for central placenta praevia, uterine inertia in an elderly

primipara, vaginal atresia and eclampsia. There were 6 stillbirths, including 1 pair of twins, giving a stillbirth rate of 24·6 per 1,000. This compared favourably with the rate of the rest of Burma, 39·6 per 1,000, and for England and Wales in 1956, 23 per 1,000. Neonatal mortality (the incidence of deaths within the first 4 weeks of life) was 53·3 per 1,000, compared with the overall figure for Burma of 57·1 per 1,000 and that of England and Wales in 1956, of 17 per 1,000.

[It would appear from this admirable study that the incidence of perinatal morbidity in a Burmese population living under good sanitary and nutritional conditions is remarkably low, but that custom and ignorance still lead to a high neonatal mortality.] *J. H. Walters*

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## BOOK REVIEWS

DEVIGNAT, René. Assistance technique en médecine africaine. Vol. I. Bactériologie, virologie, mycologie, protozoologie, hématologie. [**Medical Technical Assistance in Africa. Vol. I. Bacteriology, Virology, Mycology, Protozoology, Haematology**] pp. xv + 167, illustrated. 1958. Liége: Édition Desoer, 25, Rue Ste-Veronique. Paris: Masson et Cie.

This is the first volume of a group of three manuals of practical parasitology written for use in tropical Africa by doctors, but is meant particularly for laboratory technicians and other auxiliary personnel. The present volume is devoted to bacteriology, virology, mycology, protozoology and haematology, and these subjects are treated in an elementary manner, the practical aspect being the main consideration. The techniques are those which can be put into use in the smallest clinical laboratory, while instructions are given for the proper collection and dispatch of material for detailed examination in a fully equipped centre. Another interesting feature is the inclusion of short notes on the diseases themselves, their chemotherapy and even epidemiology.

The book opens with a description of the simpler laboratory methods used in parasitology and bacteriology, omitting biochemical techniques. The standard procedures are clearly described, and it is perhaps deliberate that certain stains and methods are left out—such as the rapid Romanowsky stains (Field's or JSB) and zinc sulphate concentration of intestinal protozoa. Chapters then follow on the viruses (classified according to the tissue they attack), rickettsiae, bacteria, mycobacteria (actinomycosis, tuberculosis and leprosy), fungi (including a useful note on *Blastocystis*) ; spirochaetes (including the borreliae, treponemata, and leptospirae) and the protozoa. A list is given of the last group, but actually many more than those on this list, and even non-African species, are mentioned in the text—and this could prove misleading to an inexperienced worker. The last chapter deals with haematology and briefly describes routine methods for blood counts, haemoglobin estimation, recognition of normal and abnormal cells, and determination of blood groups.

Adequate illustrations are provided in a number of plates, but better are the profuse tables which summarize the diagnostic characters of groups of organisms, the vaccines, chemotherapeutic agents, antibiotics, etc.

This little book will have a place in the out-stations everywhere in tropical Africa where French is understood. *P. C. C. Garnham*

WU, Lien-Teh. [M.A., M.D., M.P.H., Litt.D., Sc.D., LL.D.] **Plague Fighter. The Autobiography of a Modern Chinese Physician.** pp. x + 667, illustrated. 1959. Cambridge: W. Heffer & Sons Ltd. [30s.]

This massive volume is full of detailed information of many kinds and it forms the life story of one of the best-known figures of Chinese medicine—Dr. Wu Lien-Teh—whose memory is still fresh at Cambridge under the Europeanized synonym of Gnoh Lean-Tuck.

There can be no doubt as to the greatness of the work of the Commission in Northern Manchuria on this historic and most virulent outbreak of pneumonic plague. It was indeed a dangerous venture and required more than ordinary share of courage and endurance to perform it. Of this herioc mould the hero of this autobiography was made, and here in this book, of 24 chapters, are pages vivid with the names of doctors, scientists, administrators and politicians, mostly belonging to a long-forgotten age. It is a feat of prodigious memory to have recalled them all in this work which has taken over seven years to compile.

The main theme of this book, the fight against pneumonic plague, commences on December 24, 1910, at Harbin Station, Northern Manchuria, on a bitterly cold afternoon, and it was against this most inhospitable background that the greatest campaign was fought out and covered a period of about a year.

The first cases of coughing and blood spitting were reported already in September 1910 and steadily increased to 8–10 cases daily as the terror-stricken inhabitants fled south-east to Harbin, spreading infection as they went. From the outset the epidemic was undoubtedly pneumonic plague and had no connexion with rats.

Wu was appointed head of a large plague organization to cover the entire field from Manchuria to Shantung. It took a long time before the necessity of guarding against droplet infection, a danger of which Wu was well aware, became generally recognized. The doctors stood in front of their patients in full blast of their breaths, to examine their chests. The most unbelieving was Dr. Mesny, the French representative, who very soon succumbed; and so the tale goes on and the reaper of death stalked around in the ill-equipped Russian plague hospitals. The only cheerful episode was the extraordinary immunity of two worthy lay assistants—Liu and Ching, who volunteered to help. The former was a practising herbalist; the latter a dispenser. These two brave men stayed in the heavily infected plague hospitals at Fuihiatien for three whole months in constant attendance on the sick and dying and at first without the precaution of protective masks.

There are sorry tales of the drastic disposal of the dead. Sometimes six weeks elapsed before burial was undertaken as digging was impossible in the iron frost-bound ground. Finally, it was decided to burn them all and in one month some 1,416 corpses were soaked with paraffin and cremated.

A remarkable change for the better occurred on January 31, 1911 on the day this gruesome bonfire was at its height, and which fortunately coincided with the celebrations for the Chinese New Year. Those poor people, who had lost one-quarter of their number, were called upon to celebrate by burning the usual fire-crackers *inside* their houses, instead of on the streets. This breaking with custom, strange to relate, as if in answer to their prayers, coincided with a diminution of the mortality, and the figures diminished day by day until the outbreak came to an end in the latter half of March.

The recorded number of deaths from plague was 52,462 which, together with

those unrecorded, gave a grand total of at least 60,000. The highest rate of mortality among medical and health personnel of 46·0% was recorded in ambulance men, while native practitioners came a good second with 44·4%.

It soon became known that the demand for tarabagan skins (giant marmot (*Arctomys bobac*)) had recently grown, especially from 1907 to 1910 and this fact threw a suspicion that these animals might well be the reservoirs of pneumonic plague so that the question was brought up at the International Plague Conference in Mukden in April 1911. Later experiments with some of these captured animals and also the smaller species—the marmot—*Spermophilus citillus* showed that both were infected with *Pasteurella pestis* in the natural state and could be inoculated through the lungs. The marmot hunters in turn became plague-stricken from inhalations from the skins of these rodents.

In various chapters the author refers among other subjects to two other plague outbreaks, plague research, the plague prevention and national quarantine services, anti-cholera and other health campaigns, hospitals in China, the narcotic problem and Chinese versus Western medical practice.

The rest of the book is of a general autobiographical nature. It includes an account of the author's early life and student days at Cambridge and St. Mary's Hospital in London. These pages bear a nostalgic aura, for many names are familiar to the reviewer [but it is not correct to state that the then athletic figure of Andrew Balfour stood at 6 ft. 4 in.]. There are reminiscences too of C. W. Daniels and the Institute for Medical Research in Kuala Lumpur. The author also describes the years he spent in China under different régimes. It is clear that in order to recall the proceedings of so many meetings, congresses, persons and even speeches, the author must have been most assiduous in note-taking. This has resulted in a book that it is not always easy to read or digest. To the medical reader there is so much other detail that interest in the main medical theme is apt to flag: but as an historical record and an autobiography it is a remarkably comprehensive undertaking. *Philip Manson-Bahr*

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